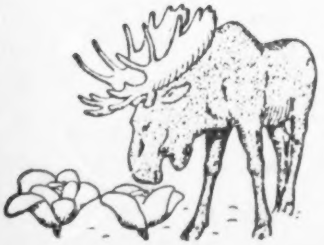
9/27/83 U5750-1(4) A

ALASKA
CROP & LIVESTOCK
REPORTING
SERVICE

JUNE 1983

ARCTIC CIRCLE
TANANA VALLEY
MATANUSKA VALLEY
KENAI PENIN
SOUTHWEST
SOUTHEAST

ALASKA AGRICULTURAL STATISTICS



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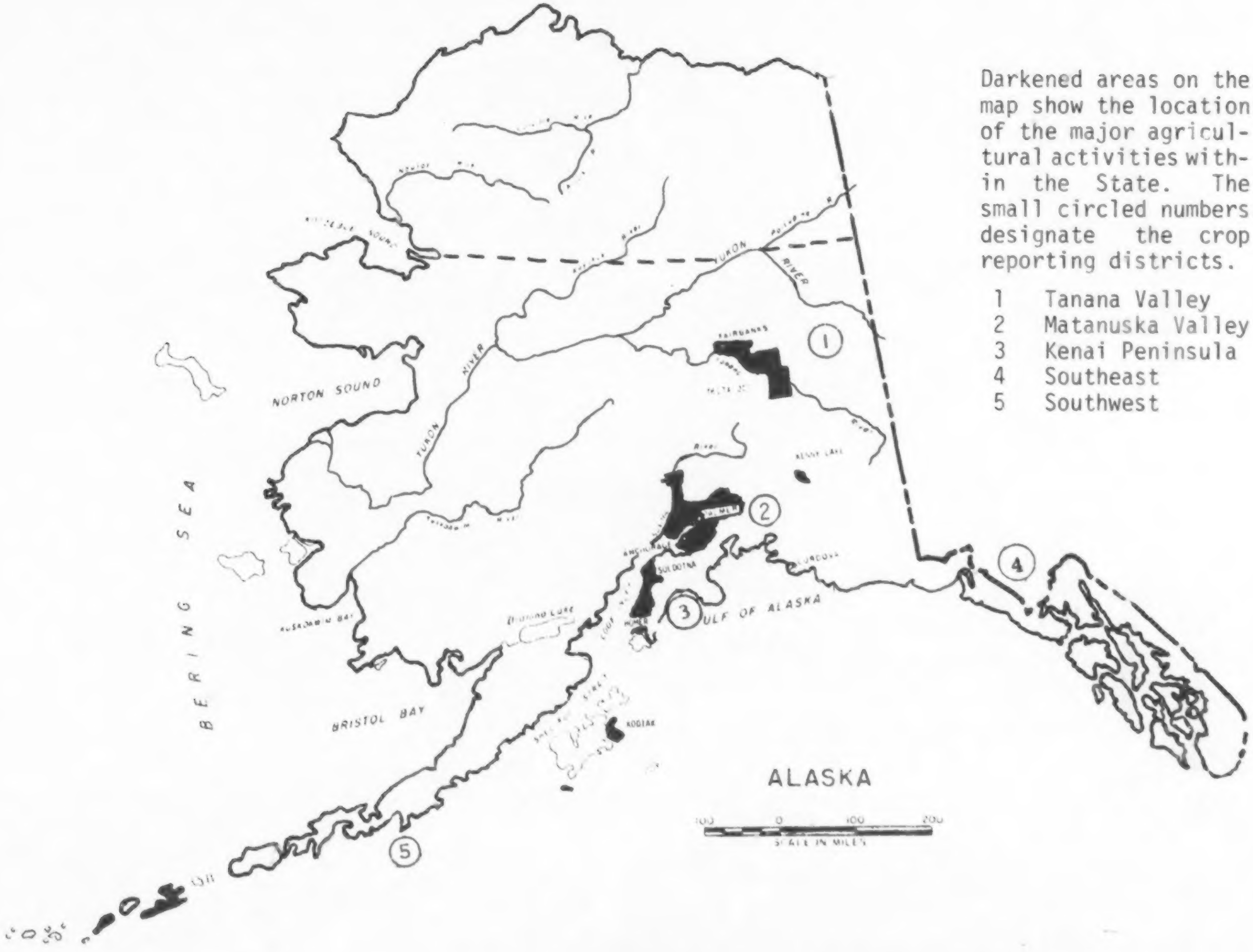
NORTON SOUND
BERING SEA
BRISTOL BAY
GULF OF ALASKA
YUKON RIVER
FAIRBANKS
PALMER
ANCHORAGE
SOLDOTNA
HOMER
CORDOVA
KODIAK
ALASKA
100 0 100 200
SCALE IN MILES
①
②
③
④
⑤

Darkened areas on the map show the location of the major agricultural activities within the State. The small circled numbers designate the crop reporting districts.

1	Tanana Valley
2	Matanuska Valley
3	Kenai Peninsula
4	Southeast
5	Southwest

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ALASKA AGRICULTURAL STATISTICS

1982

COMPILED BY

ALASKA CROP AND LIVESTOCK REPORTING SERVICE

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Dear Reader:

It is my pleasure to present the 1983 Alaska Agriculture Statistics. For over twenty years the Division of Agriculture has cooperated with the U S Department of Agriculture - Statistical Reporting Service, Cooperative Extension Service and Agricultural Experiment Station. With this combined effort we hope to bring some much needed information to the agriculture community.

The size of this publication has been cut in half in the last six years. This is due to a very strict budget and our failure to obtain printing monies elsewhere. We sincerely hope we are not leaving out information that is of value to you. If there are any statistics missing that you feel would be helpful, please inform us and we will try to correct it in the 1984 issue.

We all commend the excellent work Delon Brown and his staff have done on this publication. We hope this cooperation continues for many years.

Good farming to all in 83.

Sincerely,

Bill L. Heim

Bill L Heim
Director

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FOREWARD

Alaska is one-fifth the size of continental United States; is as large as Texas, California and Montana combined. The total land area of Alaska is approximately 375 million acres, of which 1.3 million acres were listed as land in farms in the 1979 U.S. Census of Agriculture. Agriculture production is still confined to relatively small areas of the State's total acreage (see inside front cover).

Most land in farms consist of grazing land leased from the State, the U. S. Government and Native Corporations. Crops utilized only 25,000 acres in 1982, the balance was left idle in pasture or uncleared lands. State land lotteries and sales since 1978 have placed over 140,000 acres of potential agriculture land into private ownership. Only a small percent of these acres will be in production in 1983. Alaska has over 20 million acres of potential tillable farmland, plus another 18 million suitable for potential livestock grazing. The number of farms in Alaska has been increasing from 290 in 1978 to 410 farms in 1982. The State population was estimated at 433,400 people in 1982.

The 1983 publication includes the latest official State Crop and Livestock Statistics on Agriculture in Alaska. It continues the series of "Alaska Agriculture Statistics" started in 1960.

This issue contains the preliminary estimates for 1982 along with comparable 1980 and 1981 data which have been subject to revision. Also included are pertinent historical estimates on the State level for comparison purposes. The estimates in this publication were developed from the monthly, quarterly and annual surveys conducted each year by this office. The Alaska survey response continues to be excellent and I want to express my thanks to the many farmers, ranchers, and agri-businessmen who helped us by providing basic data about the State's agriculture. I would also like to thank the other Federal, State, and University Offices for their continued support.

DELON A. BROWN
Statistician in Charge
Phone: (907) 745-4272

* * * * * * * * * * * * * * *

REPORTS AVAILABLE: 1/

ALASKA FARM REPORTER (*Monthly*)
Includes milk and egg production, potato stocks, crop production and livestock inventory.

ALASKA AGRICULTURE STATISTICS (*Annual*)
Area Estimates - Crop. Livestock and values.

CROP WEATHER (*Weekly*)
(May 1 to October 1) - Planting and harvesting progress, crop development progress and weather data.

1/ *All releases are free to crop and livestock reporters and available by subscription to non-reporters.*

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FERTILIZER CONSUMPTION - ALASKA 1981-82

	1981	1982 1/
	tons	
NITROGEN:		
Ammonium Nitrate	875	385
Urea	2,230	8,810
Ammonium Sulfate	--	75
Other	55	--
PHOSPHATES:		
Treble Super Phosphate	420	10
Ammoniated Phosphate	195	95
Other	10	--
POTASH:		
Muriate of Potash	250	50
Potassium Sulfate	10	--
Other	10	--
TOTAL MATERIALS	4,055	9,425
COMPLETE FORMULAS:		
5-10-10	20	--
5.5-26-26	40	--
6-24-24	50	--
6-26-30	--	110
6-28-14	105	--
6-31-23	--	20
7-34-15	--	20
8-32-15	55	95
8-32-16	840	480
10-15-11	40	--
10-20-10	420	430
10-20-20	190	490
12-45-8	--	50
12-50-10	40	--
15-11-11	40	--
15-21-21	140	--
15-30-14	--	20
16-16-16	290	230
COMPLETE FORMULAS:		
18-18-18	--	25
18-46-0	80	170
20-10-10	130	425
20-20-10	230	75
21-20-15	290	--
22-4-4	115	150
22-11-11	350	505
22-22-13	--	25
23-3-7	65	--
23-7-14	--	220
23-7-15	450	--
23-12-19	--	20
24-10-18	--	100
24-18-12	65	--
24-18-18	--	40
25-3-7	--	65
26-13-13	175	--
26-18-9	240	--
26-21-6	50	--
26-23-7	--	140
27-18-9	115	75
28-0-22	--	90
28-15-5.6	50	--
28-15-6	--	25
29-0-20	60	--
29-9-10	25	--
30-10-10	70	--
31-0-19	--	115
32-0-17	80	--
Miscellaneous 2/	95	150
TOTAL FORMULA	5,005	4,360
TOTAL ALL FERTILIZER	9,060	13,785
LIME	1,250	1,780

1/ Preliminary.

2/ Complete formulas of less than 20 tons combined with miscellaneous.

AGRICULTURAL COMMODITIES PRODUCED - ALASKA (Selected Years)

Commodity		1960	1965	1970	1975	1980	1982
		- - - - - - - - - - - thousand units - - - - - - - - - - -					
		CROP PRODUCTION					
OATS FOR GRAIN	Bu.	79.8	42.0	22.5	16.8	26.1	31.2
BARLEY FOR GRAIN	Bu.	87.4	67.2	46.5	70.0	339.0	315.0
ALL SILAGE	Tons	20.2	21.7	13.6	15.2	12.4	10.0
GRAIN SILAGE	Tons	15.8	17.7	7.4	4.8	4.7	4.7
GRASS SILAGE	Tons	4.4	4.0	6.2	10.4	7.7	5.3
ALL HAY	Tons	10.5	8.8	9.4	21.4	15.0	14.3
GRAIN HAY	Tons	2.5	2.2	1.5	7.1	2.7	2.5
GRASS HAY	Tons	8.0	6.6	7.9	14.3	12.3	11.8
POTATOES	Cwt.	131.4	131.0	106.8	108.7	77.0	102.0
CABBAGE	Cwt. 1/	3.6	3.0	3.5	3.0	4.1	11.9
LETTUCE	Cwt. 1/	6.2	6.5	7.9	9.5	11.2	29.4 2/
CARROTS	Cwt.	7.6	2.9	1.5	2.0	3.3	3.0
OTHER VEGETABLES	Cwt.	2.8	2.1	3.0	1.8	4.6	5.5
		LIVESTOCK AND POULTRY PRODUCTS					
EGGS	Doz.	529.8	766.7	408.0	417.0	375.0	733.0
POULTRY	Lbs.	55.0	89.0	73.0	167.0	161.0	176.0
BEEF	Lbs.	357.0	824.0	963.0	664.0	767.0	801.0
PORK	Lbs.	151.0	205.0	135.0	150.0	232.0	604.0
MUTTON	Lbs.	12.0	28.0	52.0	30.0	18.0	53.0
WOOL	Lbs.	125.0	209.0	239.0	67.0	35.0	31.0
		- - - - - - - - - - - million units - - - - - - - - - - -					
MILK	Lbs.	20.4	20.7	18.6	16.8	12.5	13.8

1/ 1982 units in cartons. 2/ Head lettuce only.

LIVESTOCK AND POULTRY ON FARMS (By Class) - ALASKA (Selected Years)

	Jan. 1 1961	Jan. 1 1965	Jan. 1 1970	Jan. 1 1975	Jan. 1 1980	Jan. 1 1982
	- - - - - - - - - - - -	- - - - - - - - - - - -	- - - thousand	head - - -	- - - - - - - - - - - -	- - - - - - - - - - - -
ALL CATTLE AND CALVES	7.3	8.3	8.7	9.7	8.4	9.0
Beef Cows	1.4	2.0	2.6	2.8	2.5	3.0
Milk Cows	2.8	2.6	1.8	1.6	1.1	1.0
Heifers 500 Pounds +	1.0	1.2	1.1	1.2	1.2	1.3
Beef Cow Replacement	.4	.5	.6	.6	.7	.8
Milk Cow Replacement	.6	.7	.5	.6	.5	.5
Steers 500 Pounds	.6	.7	.8	.6	.4	.8
Bulls 500 Pounds +	.2	.2	.5	1.0	1.2	.9
Calves Under 500 Pounds	1.3	1.6	2.0	2.5	1.9	1.9
ALL SHEEP AND LAMBS	1.5	20.0	27.0	12.4	4.3	3.3
Lambs	4.0	4.0	5.0	2.0	.7	.6
Ewes 1 Year +	6.0	9.0	11.0	6.0	2.3	1.6
Wethers and Rams 1 Year +	5.0	7.0	11.0	4.4	1.3	1.1

	Jan. 1 1961	Jan. 1 1965	Dec. 1 1969	Dec. 1 1974	Dec. 1 1979	Dec. 1 1982
	- - - - - - - - - - - -	- - - - - - - - - - - -	- - - thousand	head - - -	- - - - - - - - - - - -	- - - - - - - - - - - -
ALL HOGS AND PIGS	1.0	1.4	1.1	1.2	1.1	3.5
Slaughter Hogs and Pigs	NA	1.1	.9	.9	.8	2.8
Breeding Hogs	NA	.3	.2	.3	.3	.7
ALL CHICKENS	42.0	39.0	30.0	30.0	26.0	81.0
HPLA	41.0	38.0	28.0	29.0	24.0	57.0
Other Chickens	1.0	1.0	2.0	1.0	2.0	24.0

VALUE OF PRODUCTION BY AREAS - ALASKA 1980-82 1/

Year	Tanana Valley	Matanuska Valley	Kenai Penin.	South-East	South-West	State Total
			dollars			
			CROPS			
1980	1,927,500	3,501,000	373,000	-	60,000	5,861,500
1981	2,608,600	4,435,400	438,000	-	16,000	7,498,000
1982	2,941,200	3,653,800	532,000	-	25,000	7,152,000
			LIVESTOCK AND POULTRY			
1980	357,500	2,970,700	235,500	16,100	289,200	3,869,000
1981	634,100	3,258,800	399,300	19,500	351,300	4,663,000
1982	883,600	3,822,500	596,600	18,600	422,600	5,744,000
			TOTAL			
1980	2,285,000	6,471,700	608,500	16,100	359,200	9,730,500
1981	3,252,700	7,694,200	837,300	19,500	367,300	12,161,000
1982	3,824,800	7,476,300	1,128,600	18,700	447,600	12,896,000

1/ Includes only crop and livestock commodities in this bulletin.

NUMBER OF EQUINES BY CLASS - ALASKA 1982 1/

Area	Total Equines	Light Horses	Ponies	Draft Horses	Mules and Donkeys
Fairbanks North Star Borough	869	759	83	13	5
Matanuska-Susitna Borough	1,250	1,126	98	14	12
Kenai Peninsula Borough	1,220	1,117	58	9	36
Kodiak Island	190	141	49	-	-
Municipality of Anchorage	1,320	1,199	113	6	2
Other	790	700	55	25	10
Total	5,630	5,402	456	67	65
% of Total	100	89.6	8.1	1.2	1.1

1/ The number of equine in an area encompassing the North Star Borough, Mat-Su Borough, Kenai Peninsula Borough, Kodiak Borough, Municipality of Anchorage, and Other surrounding area from Tok to Mt. McKinley and Valdez to Delta Junction totaled 5,630 head on August 1, 1982.

FARM COMMODITY CASH RECEIPTS - ALASKA 1980-82

Items	1980	1981	1982 1/
TOTAL ALL COMMODITIES	11,819,000	14,260,000	16,488,000
Total Livestock Products	4,147,000	5,088,000	6,408,000
All Meat Animals	494,000	571,000	954,000
Cattle and Calves	268,000	287,000	309,000
Sheep and Lambs	5,000	9,000	20,000
Hogs and Pigs	221,000	275,000	625,000
All Dairy Products	2,118,000	2,465,000	2,791,000
Milk Wholesale	1,978,000	2,400,000	2,726,000
Milk Retail	140,000	65,000	65,000
All Poultry and Eggs	461,000	695,000	892,000
Poultry	11,000	25,000	19,000
Eggs	450,000	670,000	873,000
All Miscellaneous Livestock	1,074,000	1,357,000	1,771,000
Wool	25,000	8,000	20,000
Other Livestock 2/	1,049,000	1,349,000	1,751,000
Total All Crops	7,672,000	9,172,000	10,080,000
All Feed Crops	1,853,000	2,684,000	2,402,000
Barley	885,000	869,000	997,000
Hay	952,000	1,776,000	1,311,000
Oats	16,000	39,000	94,000
All Vegetables	1,725,000	2,148,000	2,162,000
Potatoes	1,137,000	1,502,000	1,425,000
Miscellaneous Vegetables	588,000	646,000	737,000
Berries	25,000	27,000	25,000
All Other Crops 3/	4,069,000	4,313,000	5,491,000

1/ Preliminary. 2/ Includes equine, fox, goats, honey, mink, rabbits, reindeer, and other livestock and products. 3/ Includes forest products, greenhouse, nursery, seed and other field crops not mentioned above.

ALASKA'S 1982 CROP SEASON

MATANUSKA VALLEY: A late spring and cold weather limited field activity in most areas until mid-May. Small grain seeding, potato planting and vegetable planting averaged 10 to 14 days behind normal due to wet fields and cold soils. Virtually all planting was complete by the first week of June. June soil temperatures were 7 to 10 degrees colder than normal during the same period in 1980 and 1981. Crop emergence and growth also lagged in most areas. Haying started on a few fields, but most fields were short and harvest was delayed. Most of the first crop was up before the end of July; however, persistent showers caused problems the last half of July and early August. Topsoil moisture supplies were generally adequate or better throughout the growing season except for the first week of July. Vegetable harvest started in mid-July. Nearly all crops were behind normal throughout the growing season. Vegetable supplies were plentiful throughout August and much of September. Cool temperatures and rain during September curtailed most harvesting activity. Scattered frosts started in early September although the heavy frost did not occur until early October. Combining and second cutting was delayed during September and in early October snow fell and remained until after the first of the new year.

TANANA VALLEY: A late thaw and wet fields curtailed most field activity until after May 10. Field work was generally 15 days behind normal through most of May. Nearly 70 percent of the barley was seeded during the first week of June, after growers worked long hours in an attempt to get caught up. Crop emergence and growth was slow. Haying activities were in full swing by the end of June and moved ahead quickly in early July. Condition of small grain was good to excellent but maturity was behind schedule. Crop growth accelerated in late July and August. Soil moisture supplies were generally adequate or better throughout most of the growing season. Frost ended the growing season on August 28; however, most small grain fields were mature enough that little damage was done. Swathing and combining started in late August. Combining and cutting second crop hay made excellent progress during mid-September. Harvest of most crops was nearing completion by early October when wet snow and rain caused light to severe damage to the remaining grain fields.

KENAI PENINSULA: Field activity started in most areas the third week of May. Crop growth was slow during June and condition was below average. Haying was general in early July and continued off and on until late August on some farms. Crop growth and maturity remained behind normal throughout the growing season. Soil moisture supplies ranged from short to adequate until late in the season when most areas reported surplus supplies. Wet conditions limited potato digging until late September and early October.

1982 HARVESTED ACRES

1.	Grass Hay	45.8%
2.	Barley Grain	31.5%
3.	Grain Hay	9.3%
4.	Grass Silage	4.6%
5.	Potatoes & Vegetables	3.3%
6.	Grain Silage	3.0%
7.	Oats Grain	2.5%

ALASKA CROP SUMMARY

BARLEY was planted on 8,500 acres in 1982, 8,000 acres less than in 1981. Growers harvested 7,900 acres of which 7,500 acres were harvested for grain. Production of Barley For Grain was 315,000 bushels, 64,000 bushels above 1981. Yield averaged 42.0 bushels or 20.2 cwt. per acre. Value of the 1982 crop, at $1,134,000 was $105,000 above the 1981 level.

OAT growers planted 3,200 acres of oats, 2,800 acres less than 1981. Growers harvested 2,500 acres, 1,700 below last year's level. Most of the oat acreage was harvested for hay in 1982.

OATS FOR GRAIN was harvested from 600 acres, up from 500 acres harvested in 1981. Production at 31,200 bushels was up 9,500 bushels from the 1981 production. The State's yield averaged 52.0 bushels or 16.6 cwt. per acre. Value of the 1982 crop at $156,000 was $91,000 above the previous year.

MIXED GRAINS for hay and silage were harvested from 600 acres, compared with 700 acres in 1981. Production is included with hay and silage data.

ALL HAY production of 14,300 tons was down 5,900 tons from the 1981 production and the smallest crop since 1971. The State average yield at 1.09 tons per acre, compares with 1.40 tons per acre in 1981. The 1982 crop was harvested from 13,100 acres, down from 14,400 acres a year earlier. Production value of all hay at $2,717,000 was down $515,000 from the previous year.

GRASS HAY was harvested from 10,900 acres, 300 acres less than in 1981. Production of 11,800 tons of grass hay was 2,900 tons below the 1981 level. Seeded grass hay-brome, timothy, etc.-is harvested mostly in the Tanana and Matanuska Valleys. Native grasses make up much of the Kenai Peninsula hay production.

GRAIN HAY, mostly oat hay, was harvested from 2,200 acres, off 1,000 acres from the previous year. Production totaled 2,500 tons, compared with 5,500 tons in 1981.

ALL SILAGE production of 10,000 tons was down 2,800 tons from the previous year. A total of 1,800 acres of silage was harvested, down 1,200 acres from 1981. GRASS SILAGE was harvested from 1,100 acres and produced 5,300 tons. GRAIN SILAGE produced 4,700 tons from 700 acres. Silage is produced mainly by Grade A dairies in the Matanuska Valley. Production value of all silage at $428,000, was $71,000 less than a year ago.

POTATO production of 102,000 cwt. was harvested from 480 acres, compared with 95,000 cwt. in 1981. Value of production at $1,938,000 was $57,000 below the 1981 crop.

VEGETABLES were harvested from 306 acres, 33 acres more than the previous year. Value of all vegetables produced, excluding greenhouse vegetables was $779,000 compared with $678,000 in 1981. HEAD LETTUCE production of 29,400 cartons were harvested from 109 acres in 1982. Lettuce data reflects head lettuce for 1981 and 1982. Lettuce data prior to 1981 included all lettuce. Other types of lettuce are included in other vegetables. An annual average carton weight of head lettuce in Alaska was 45 pounds in 1981 and 52 pounds in 1982. CABBAGE production of 11,900 cartons were produced on 37 acres in 1982. An annual average carton weight for cabbage in Alaska was 50 pounds in 1981 and 51 pounds in 1982.

CARROT production totaled 3,000 cwt., 700 cwt. below 1981. Acres harvested at 29 was slightly above last year's level. Other vegetables were harvested from 131 acres, 26 acres above the previous year.

CROPLAND UTILIZATION - ALASKA 1982

Crops	Tanana Valley	Matanuska Valley	Kenai Penin. 1/	South West 1/	State Total
			Acres		
			PLANTED AREA		
COMMERCIAL VEGETABLES					
Potatoes	95	415	20	-	530
Lettuce	14	110	-	-	124
Cabbage	6	37	-	-	43
Carrots	9	23	-	-	32
Other Vegetables	20	130	5	0	155
FEED CROPS					
All Oats	2,300	500	400	-	3,200
All Barley	7,700	600	200	-	8,500
Grain Mixtures	100	600	-	-	700
GRASSLAND HARVESTED					
Grass	4,250	5,550	2,100	100	12,000
TOTAL LAND IN CROPS	14,494	7,965	2,725	100	25,284
Percent of State Total	57.3	31.5	10.8	.4	100
			HARVESTED AREA		
COMMERCIAL VEGETABLES					
Potatoes	90	370	20	-	480
Lettuce	13	96	-	-	109
Cabbage	6	31	-	-	37
Carrots	8	21	-	-	29
Other Vegetables	20	106	5	-	131
FEED CROPS					
Oats-All Purposes	2,000	200	300	-	2,500
Barley-All Purposes	7,450	350	100	-	7,900
Grain Mixtures	100	500	-	-	600
Grass	4,250	5,550	2,100	100	12,000
			FEED CROP UTILIZATION		
GRAIN					
Oats	550	50	-	-	600
Barley	7,250	250	-	-	7,500
HAY					
Grain	1,500	300	400	-	2,200
Grass	4,200	4,500	2,100	100	10,900
SILAGE					
Grain	250	450	-	-	700
Grass	50	1,050	-	-	1,100

1/ Dash indicates no crop produced or combined with other areas.

BARLEY AND OATS - ALASKA 1980-82

District	Year	Area Planted Acres	AREA HARVESTED FOR GRAIN				
			Acres	Yield Bu.	Production Bu. (000)	Production Cwt.	Value (000)
					BARLEY		
Tanana Valley	1980	12,500	10,600	29.2	309.6	148,600	904.0
	1981	15,600	7,800	32.9	224.0	107,505	899.0
	1982	7,700	7,250	42.5	308.0	147,800	1,100.0
Matanuska Valley	1980	1,400	900	32.7	29.4	14,100	113.0
	1981	900	700	38.6	27.0	13,000	130.0
	1982	600	250	28.0	7.0	3,400	34.0
Kenai Peninsula	1980	100	-	-	-	-	-
	1981	-	-	-	-	-	-
	1982	200	-	-	-	-	-
State Total	1980	14,000	11,500	29.5	339.0	162,700	1,017.0
	1981	16,500	8,500	29.5	251.0	120,500	1,029.0
	1982	8,500	7,500	42.0	315.0	151,200	1,134.0
					OATS		
Tanana Valley	1980	2,100	450	42.9	19.3	6,200	52.0
	1981	5,100	300	47.7	14.3	4,600	39.0
	1982	2,300	550	53.1	29.2	9,400	144.0
Matanuska Valley	1980	600	150	45.3	6.8	2,200	29.0
	1981	600	200	37.0	7.4	2,400	26.0
	1982	500	50	40.0	2.0	600	12.0
Kenai Peninsula	1980	400	-	-	-	-	-
	1981	300	-	-	-	-	-
	1982	400	-	-	-	-	-
State Total	1980	3,100	600	43.5	26.1	8,400	81.0
	1981	6,000	500	43.5	21.7	7,000	65.0
	1982	3,200	600	52.0	31.2	10,000	156.0

HAY AND SILAGE - ALASKA 1980-82

District	Year	Area Harvested Acres	Production Tons	Production Value (000)	Area Harvested Acres	Production Tons	Production Value (000)
				HAY			
			GRAIN HAY 1/			GRASS HAY	
Tanana Valley	1980	1,800	2,000	270.0	3,100	2,000	310.0
	1981	2,600	4,900	733.0	3,600	3,700	584.0
	1982	1,500	1,900	333.0	4,200	5,000	900.0
Matanuska Valley	1980	450	500	66.0	5,800	7,900	1,094.0
	1981	300	300	46.0	5,900	9,300	1,549.0
	1982	300	300	59.0	4,500	4,400	903.0
Kenai Peninsula	1980	150	200	25.0	1,300	1,800	275.0
	1981	300	300	47.0	1,600	1,600	257.0
	1982	400	300	57.0	2,100	2,300	440.0
Southwest 2/	1980	-	-	-	200	400	60.0
	1981	-	-	-	100	100	16.0
	1982	-	-	-	100	100	25.0
State Total	1980	2,400	2,700	361.0	10,400	12,300	1,739.0
	1981	3,200	5,500	826.0	11,200	14,700	2,406.0
	1982	2,200	2,500	449.0	10,900	11,800	2,268.0
				SILAGE			
			GRAIN SILAGE 1/			GRASS SILAGE	
Tanana Valley	1980	850	1,000	38.0	50	100	4.0
	1981	600	1,400	48.0	300	500	20.0
	1982	250	1,200	46.0	50	100	4.0
Matanuska Valley	1980	700	3,000	108.0	1,550	7,400	303.0
	1981	750	4,500	171.0	1,250	6,000	246.0
	1982	450	3,500	144.0	1,050	5,200	234.0
Kenai Peninsula	1980	350	700	24.0	100	200	7.0
	1981	50	200	7.0	50	200	7.0
	1982	-	-	-	-	-	-
State Total	1980	1,900	4,700	170.0	1,700	7,700	314.0
	1981	1,400	6,100	226.0	1,600	6,700	273.0
	1982	700	4,700	190.0	1,100	5,300	238.0

1/ Includes mixed grains, oats and barley. 2/ Includes Southeast.

ALL HAY AND ALL SILAGE - ALASKA 1980-82

District	Year	Area Harvested Acres	Yield Tons	Production	
				Tons	Value (000)
				ALL HAY	
Tanana Valley	1980	4,900	.86	4,200	580.0
	1981	6,200	1.39	8,600	1,317.0
	1982	5,700	1.21	6,900	1,233.0
Matanuska Valley	1980	6,250	1.34	8,400	1,160.0
	1981	6,200	1.55	9,600	1,595.0
	1982	4,800	.98	4,700	962.0
Kenai Peninsula	1980	1,450	1.38	2,000	300.0
	1981	1,900	1.00	1,900	304.0
	1982	2,500	1.04	2,600	497.0
Southwest [1/]	1980	200	2.00	400	60.0
	1981	100	1.00	100	16.0
	1982	100	1.00	100	25.0
State Total	1980	12,800	1.17	15,000	2,100.0
	1981	14,400	1.40	20,200	3,232.0
	1982	13,100	1.09	14,300	2,717.0
				ALL SILAGE	
Tanana Valley	1980	900	1.22	1,100	42.0
	1981	900	2.11	1,900	68.0
	1982	300	4.33	1,300	50.0
Matanuska Valley	1980	2,250	4.62	10,400	411.0
	1981	2,000	5.25	10,500	417.0
	1982	1,500	5.80	8,700	378.0
Kenai Peninsula	1980	450	2.00	900	31.0
	1981	100	4.00	400	14.0
	1982	-	-	-	-
State Total	1980	3,600	3.44	12,400	484.0
	1981	3,000	4.27	12,800	499.0
	1982	1,800	5.56	10,000	428.0

[1/] Includes Southeast.

POTATOES - ALASKA 1980-82

District	Year	Area Harvested Acres	Yield Cwt.	Production Cwt.	Production Value (000)
Tanana Valley	1980	95	129	12,300	267.0
	1981	80	110	8,800	194.0
	1982	90	162	14,600	307.0
Matanuska Valley	1980	340	184	62,700	1,254.0
	1981	395	204	80,500	1,681.0
	1982	370	232	85,700	1,596.0
Kenai Peninsula	1980	25	80	2,000	42.0
	1981	25	228	5,700	120.0
	1982	20	85	1,700	35.0
State Total	1980	460	167	77,000	1,563.0
	1981	500	190	95,000	1,995.0
	1982	480	213	102,000	1,938.0

POTATO STOCKS - ALASKA 1980-82

Crop Year	Total Production	Oct 1	Dec 1	Jan 1	Feb 1	Mar 1	Apr 1	May 1	Jun 1
	- - - - - - - -	- - -	- - -	- - -	hundred weight	- - -	- - -	- - -	- - -
1980	77.0	72.5	59.0	52.0	41.5	33.5	26.0	19.5	7.5
1981	95.0	88.5	67.5	57.0	50.5	40.0	33.5	24.0	11.5
1982	102.0	93.0	76.0	64.0	51.0	40.0	32.0	22.5	NA

POTATO PRODUCTION, DISPOSITION AND AVERAGE PRICE - 1979-81

Crop Year	Production	Total Seed	Farm Food Seed 1/	Lost and Shrinkage	Sold	Price Per Cwt.
	- - - - - - - -	- - - - -	- - - hundred	weight - - -	- - - - -	- - - - -
1979	85.0	5.6	7.0	[illegible]	63.0	12.30
1980	77.0	8.4	10.5	10.5	56.0	20.30
1981	95.0	6.7	8.5	15.0	71.5	21.00

1/ Household use, fed livestock, and seed used on farm where grown.

MIXED GRAINS 1/ (All Purposes) - ALASKA 1980-82

District	1980	1981	1982	1980	1981	1982
	Acres					
	AREA PLANTED			AREA HARVESTED		
Tanana Valley	50	-	100	50	-	100
Matanuska Valley	450	650	500	450	650	500
Kenai Peninsula	-	50	-	-	50	-
State Total	500	700	700	500	700	600

1/ Includes mixtures of oats, barley, peas and vetch.

LETTUCE, CABBAGE, CARROTS AND OTHER VEGETABLES - ALASKA 1980-82

District	Year	Area Harv. Acres	Production Ctn.	Production Cwt.	Production Value	Area Harv. Acres	Production Cwt.	Production Value
				LETTUCE			CARROTS	
Tanana Valley	1980 1/	15		1,200	42,000	7	300	10,000
	1981	14	2,500		39,000	6	700	25,000
	1982	13	2,600		31,000	8	700	21,000
Matanuska Valley 2/	1980 1/	85		10,000	200,000	21	3,000	102,000
	1981	86	20,900		235,000	21	3,000	96,000
	1982	96	26,800		306,000	21	2,300	69,000
State Total	1980 1/	100		11,200	242,000	28	3,300	112,000
	1981	100	23,400		274,000	27	3,700	121,000
	1982	109	29,400		337,000	29	3,000	90,000
				CABBAGE			OTHER VEGETABLES 2/	
Tanana Valley	1980	7		300	7,500	14	500	23,000
	1981	7	1,400		17,600	13	200	10,000
	1982	6	1,700		21,200	20	800	34,000
Matanuska Valley 2/	1980	20		3,800	72,000	58	4,100	160,000
	1981	34	7,700		84,400	92	4,500	171,000
	1982	31	10,200		103,800	111	4,700	193,000
State Total	1980	27		4,100	79,500	72	4,600	183,000
	1981	41	9,100		102,000	105	4,700	181,000
	1982	37	11,900		125,000	131	5,500	227,000

1/ Includes all types of lettuce. 2/ Includes Kenai Peninsula. 3/ Excludes greenhouse grown vegetables.

ALASKA LIVESTOCK AND POULTRY-1982

CATTLE AND CALVES: There were 9,000 head of cattle and calves on Alaska farms and ranches January 1, 1983, off 200 head from last year. Inventory value of all cattle on January 1, 1983 totaled $5,085,000.

DAIRY: Milk cows that have calved numbered 1,000 on January 1, 1983, down 100 head from the previous January 1. There were 500 head of dairy replacement heifers.

The number of Grade A dairies in the State on January 1, 1983, totaled 11 of which 8 were located in the Matanuska Valley; two in the Tanana Valley near Delta Junction; and one on the Kenai Peninsula near Kasilof.

MILK PRODUCTION in 1982 totaled 13.8 million pounds, 400,000 pounds more than in 1981. The value of milk produced, at $2,963,000, was $362,000 more than a year ago. The 1982 value per hundredweight of $21.47 compares with $19.41 in 1981.

BEEF: Beef cattle (all cattle and calves less milk cows and dairy replacement heifers) numbered 7,500 head, 100 below the January 1, 1982 number. Beef cow numbers, at 3,000 head, were unchanged from the previous year. Replacement heifers are estimated at 900 head.

Marketing and transportation problems continues to be main obstacles of the rancher. Most beef are sold off the range at the end of the grazing season.

HOGS: There were 3,500 hogs and pigs on Alaska farms on December 1, 1982, up from 2,800 head the previous year. Total value of hogs on December 1, 1982 was $551,000, compared with $392,000 on December 1, 1981.

SHEEP: Stock sheep and lambs in Alaska on January 1, 1983, totaled 3,300 head, down 600 head from a year earlier; a record low since our records began in 1960. Inventory value of sheep was estimated at $337,000 compared with $369,000 a year earlier.

WOOL PRODUCTION of 31,000 pounds, was up from 15,000 pounds in 1981. The 2,500 head shorn compares with 1,500 head shorn in 1981. Fleece weight of 12.4 pounds was up from the 10.7 pounds previous year. Value of 1982 wool crop was $20,000.

POULTRY: All chickens on farms and commercial laying flocks in Alaska totaled 81,000 on December 1, 1982. Value of all chickens totaled $381,000, up from $187,000 a year earlier.

EGG PRODUCTION totaled 733,000 dozen in 1982, 175,000 dozen more than in 1981. and compares with the high of 850,000 dozen in 1966. Value of eggs produced in 1982 was about $873,000, $203,000 above the previous year.

CATTLE ON FARMS JANUARY 1 - ALASKA 1981-83

District	1981	1982	1983	1981	1982	1983
	BEEF COWS THAT HAVE CALVED			MILK COWS THAT HAVE CALVED		
Tanana Valley	230	480	530	80	180	140
Matanuska Valley	190	170	110	980	880	820
Kenai Peninsula	240	330	270	30	30	30
Southwest 1/	1,840	2,020	2,090	10	10	10
State Total	2,500	3,000	3,000	1,100	1,100	1,000
VALUE (000) DOLLARS	1,249.0	1,650.0	1,790.0	913.0	924.0	840.0
	BEEF REPLACEMENT HEIFERS 2/			DAIRY REPLACEMENT HEIFERS 2/		
Tanana Valley	260	120	210	30	50	50
Matanuska Valley	60	70	50	460	440	440
Kenai Peninsula	80	120	70	10	10	10
Southwest 1/	500	690	470	-	-	-
State Total	900	1,000	800	500	500	500
VALUE (000) DOLLARS	495.0	562.0	470.0	280.0	290.0	306.0
	STEERS 2/			BULLS 2/		
Tanana Valley	40	60	160	30	50	60
Matanuska Valley	50	110	120	50	40	50
Kenai Peninsula	30	30	100	40	40	30
Southwest 1/	480	500	420	880	670	760
State Total	600	700	800	1,000	800	900
VALUE (000) DOLLARS	330.0	406.0	480.0	630.0	544.0	610.0
	CALVES 3/			ALL CATTLE		
Tanana Valley	120	370	300	790	1,310	1,460
Matanuska Valley	550	570	490	2,340	2,280	2,100
Kenai Peninsula	160	170	250	590	730	790
Southwest 1/	970	990	860	4,680	4,880	4,650
State Total	1,800	2,100	1,900	8,400	9,200	9,000
VALUE (000) DOLLARS	387.0	546.0	530.0	4,284.0	4,922.0	5,085.0

1/ Includes Southeast. 2/ Over 500 Pounds. 3/ Under 500 Pounds.

HOGS AND POULTRY ON FARMS DECEMBER 1 - ALASKA 1980-82

District	1980	1981	1982	1980	1981	1982
		ALL HOGS			HENS & PULLETS OF LAYING AGE	
Tanana Valley	740	1,550	1,930	3,600	2,900	900
Matanuska Valley	950	1,140	1,450	20,200	27,700	35,700
Kenai Peninsula	70	60	80	4,000	4,100	20,000
Southeast 1/	40	50	40	200	300	400
State Total	1,800	2,800	3,500	28,000	35,000	57,000
VALUE (000) DOLLARS	254.0	292.0	551.0	118.0	179.0	268.0
		ALL CHICKENS			CHICKENS RAISED 2/	
Tanana Valley	5,000	3,400	5,800	26,000	28,000	22,500
Matanuska Valley	30,200	28,500	46,900	49,800	50,800	55,000
Kenai Peninsula	5,500	4,600	27,600	12,000	26,000	47,000
Southeast 1/	300	500	700	3,200	2,200	2,500
State Total	41,000	37,000	81,000	91,000	107,000	127,000
VALUE (000) DOLLARS	168.0	187.0	381.0	NA	NA	NA

1/ Includes Southwest.
2/ Purchased during the year, excludes death loss before reaching 20 weeks of age.

CALF CROP - ALASKA
(Selected Years)

Year	Cows and Heifers That Have Calved January 1	Calving Percentage	Calf Crop
1975	4,400	80	3,500
1980	3,600	78	2,800
1982	4,000	75	3,000

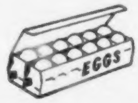
PIG CROP - ALASKA
(Selected Years)

Year	Farrowed	Pigs Per Litter	Pigs Saved
	Spring Farrowings		
1975	50	8.0	400
1980	170	7.1	1,200
1982	380	7.6	2,900
	Fall Farrowings		
1975	50	7.5	400
1980	210	6.7	1,400
1982	350	7.7	2,700

EGG PRODUCTION BY MONTHS - ALASKA 1980 and 1982

Months	Hens and Pullets		Eggs Per Layer		Egg Production	
	1980	1982	1980	1982	1980	1982
					- - (000) - -	
December 1/	24,000	35,000	18.10	21.82	435	765
January	23,000	34,000	16.59	20.49	380	695
February	22,000	34,000	14.59	16.02	320	545
March	22,000	33,000	15.13	16.99	330	560
April	22,000	33,000	14.77	18.21	325	600
May	23,000	33,000	14.78	19.00	340	625
June	24,000	36.000	15.27	18.60	365	670
July	24,000	39,000	17.61	20.27	425	790
August	23,000	50,000	16.96	20.27	390	810
September	23,000	46,000	16.20	17.91	375	825
October	24,000	54,000	16.25	16.52	390	890
November	27,000	58,000	15.18	17.40	410	1,010

1/ December preceding year.



EGGS - ALASKA 1980-82

District	Year	Av. Number of Layers	Production		Sales
			Dozen	(dollars)	(dozen)
Tanana Valley	1980		15,000	21,500	92,000
	1981	NOT	65,000	97,500	58,000
	1982		38,000	70,000	30,000
Matanuska Valley	1980		341,000	401,000	330,000
	1981	ESTIMATED	520,000	470,000	412,000
	1982		500,000	571,000	491,000
Kenai Peninsula	1980		16,000	23,000	12,000
	1981	BY	67,000	93,500	60,000
	1982		190,000	224,000	185,000
Southeast 1/	1980		3,000	4,500	800
	1981	DISTRICTS	6,000	9,000	3,000
	1982		5,000	8,000	2,000
State Total	1980	24,000	375,000	450,000	352,000
	1981	26,000	558,000	670,000	533,000
	1982	39,000	733,000	873,000	708,000

1/ Includes Southwest.

MEAT PRODUCTION - ALASKA 1980-82

District	Year	Production Pounds Dr. Wt.	Production Dollar Value	Production Pounds Dr. Wt.	Production Dollar Value
		BEEF AND VEAL		PORK	
Tanana Valley	1980	116,000	138.000	85,000	86,000
	1981	130,000	162,000	137,000	137,000
	1982	134,000	181,000	277,000	308,000
Matanuska Valley	1980	296,000	294,000	124,000	120,000
	1981	274,000	320,000	134,000	131,000
	1982	282,000	355,000	293,000	321,000
Kenai Peninsula	1980	120,000	143,000	12,000	13,000
	1981	104,000	142,000	11,000	12,000
	1982	126,000	193,000	23,000	26,000
Southeast 1/	1980	235,000	249,000	11,000	13,000
	1981	241,000	325,000	11,000	13,000
	1982	259,000	364,000	11,000	13,000
State Total	1980	767,000	824,000	232,000	232,000
	1981	749,000	949,000	294,000	293,000
	1982	801,000	1,093,000	604,000	668,000

District	Year	Pounds Dr. Wt.	Dollar Value
		POULTRY	
Tanana Valley	1980	52,800	28,000
	1981	66,400	36,500
	1982	45,500	23,000
Matanuska Valley	1980	85,000	43,700
	1981	104,600	54,500
	1982	72,700	34,400
Kenai Peninsula	1980	15,900	8,500
	1981	55,700	30,600
	1982	53,400	27,100
Southeast 1/	1980	7,300	3,800
	1981	4,300	2,400
	1982	4,500	2,500
State Total	1980	161,000	84,000
	1981	231,000	124,000
	1982	176,000	87,000

1/ Includes Southwest

MILK PRODUCTION BY MONTHS - ALASKA 1980 AND 1982

Month	Milk Cows in Herd 1/		Milk Per Cow		Milk Production	
	1980	1982	1980	1982	1980	1982
			- - pounds - -		-thousand pounds-	
January	1,100	1,100	945	1,065	1,040	1,170
February	1,100	1,100	870	1,00	960	1,110
March	1,100	1,100	935	1,070	1,030	1,180
April	1,000	1,100	980	1.020	980	1,120
May	1,000	1,100	1,040	1,080	1,040	1,190
June	1,000	1,100	1,060	1,080	1,060	1,190
July	1,000	1,100	1,140	1,030	1,140	1,240
August	1,000	1,100	1,090	1,035	1,090	1,250
September	1,000	1,100	1,050	1,080	1,050	1,190
October	1,100	1,000	935	1,100	1,030	1,100
November	1,100	1,000	910	1,020	1,000	1,020
December	1,100	1,000	980	1,050	1,080	1,050
ANNUAL	1,100	1,100	11,364	12,545	12,500	13,800

1/ Includes all fresh and dry cows.

MILK PRODUCTION AND VALUE - ALASKA 1980-82

District	Year	Production		Value	Percent
		Pounds (000)	Value (000)	Per Cwt.	Milkfat
Tanana Valley 1/	1980	600	132	NOT ESTIMATED BY DISTRICTS	
	1981	1,500	320		
	1982	1,800	425		
Matanuska Valley	1980	11,900	2,112		
	1981	11,900	2,281		
	1982	12,000	2,538		
State Total	1980	12,500	2,244	17.95	3.58
	1981	13,400	2,601	19.41	3.58
	1982	13,800	2,963	21.47	3.59

1/ Includes Kenai Peninsula.

SHEEP, LAMB, WOOL AND MUTTON - ALASKA

SHEEP AND LAMBS ON FARMS
JANUARY 1, 1981-83 - ALASKA

Year	EWES ON YEAR PLUS State Total	Value (000)
1981	2,000	189.0
1982	1,900	190.0
1983	1,600	176.0

Year	WETHERS AND RAMS ONE YEAR PLUS State Total	Value (000)
1981	1,300	104.0
1982	1,400	126.0
1983	1,100	104.0

Year	ALL LAMBS State Total	Value (000)
1981	600	48.0
1982	600	53.0
1983	600	57.0

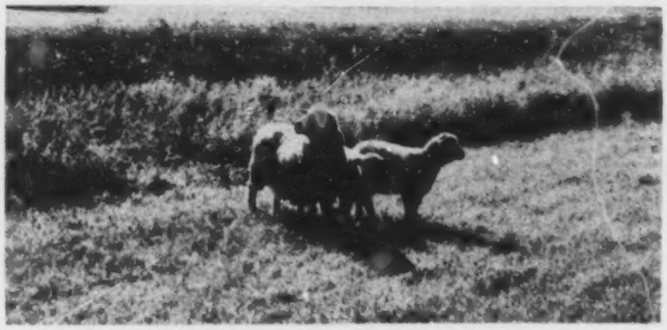
Year	ALL SHEEP AND LAMBS State Total	Value (000)
1981	3,900	341.0
1982	3,900	369.0
1983	3,300	337.0

LAMB CROP - ALASKA
(Selected Years)

Year	Ewes One Year Old and Over January 1	Lambing Percentage	Lambs Saved
1975	6,000	17	1,000
1980	2,000	26	600
1982	1,900	37	700

WOOL PRODUCTION - ALASKA 1980-82

Year	PRODUCTION Pounds	PRODUCTION Value (Dollars)
1980	35,000	25,000
1981	16,000	8,000
1982	31,000	20,000



LAMB AND MUTTON - ALASKA 1980-82

Year	PRODUCTION Pounds Dr. Wt.	PRODUCTION Value (Dollars)
1980	18,000	10,000
1981	18,000	18,000
1982	40,000	53,000

ALASKA'S CLIMATE

Temperature and precipitation vary considerably from one end of the State to the other. Although several areas of the State have suitable soils, as well as a favorable climate for agriculture, most farms are located in the Railbelt. This area includes the Tanana Valley, Matanuska Valley, and Kenai Peninsula.

MATANUSKA VALLEY, surrounding the Palmer area and near Anchorage, is the major agriculture producing area. The Valley not only has good soils, but the most suitable climate for agriculture of any area in the State. Temperatures are a little more moderate than the Interior. The Anchorage and Palmer area has up to 19 hours of daylight. Summer and fall seasons have frequent showers and cloudy weather. Total precipitation is limited, but usually adequate. The connecting Susitna Valley has a shorter growing season; otherwise similar conditions prevail. April, May, and June are the driest months.

TANANA VALLEY, from Fairbanks to Delta Junction, is the second most important existing agriculture area. Temperature changes are more severe because of the distance from the ocean. Warming and cooling trends in the spring and autumn are quite rapid. Summers are shorter, and warmer but winters are colder than other areas of the State. In spite of the short growing season, the long days of sunshine and warmer temperatures make crops grow and mature faster. Fairbanks has up to 21 hours of daylight.

KENAI PENINSULA has primarily a maritime weather situation. Temperatures are moderated by effects of the water. Frosts are fairly frequent until mid-June. Precipitation is higher than the other areas of the Railbelt. Crops have to be carefully selected for their tolerance of frosts and a shorter growing season.

OTHER AREAS including Kodiak and other islands along the Aleutian Chain, as well as the Southeast, all have a maritime climate with warmer winters and cooler summers than the Interior . Cloudy weather and frequent rains often delay crop maturity.

Detailed summaries are shown on the following pages for temperature, precipitation and growing degree days. Data for these summaries were taken from monthly Climatological Data publications, NOAA, Environmental Data Service and may vary somewhat from the annual Climatological Data publication when it becomes available.

The length of growing season (GS) shown in the 1982 and historic temperature summaries is based on 32°. The GS is the number of days between the last spring and first fall occurrence of 32°. Official Weather Service temperatures are recorded at the five foot level; therefore, minimum temperatures taken near the ground level will normally be colder than the official readings by as much as 10°.

Growing degree days as shown on the inside back cover are based on an average temperature of 40°. Only temperature values above 40° contribute to growing degree days used in Alaska. For example; the average for July in Big Delta is 60°; therefore. 60°-40°= 20°, multiplied by 31 days in the month of July gives 620 growing season degree days (does not always agree with table due to rounding off monthly temperatures to whole degrees).

Permafrost is underlain in all areas of the State except the southern edge from the Southeast through the Matanuska Valley down the Aleutian Chain. Permafrost is a condition where soil remains frozen throughout the year. Usually, it does not exist where the annual mean temperature is 32°F or above. Vegetation insulates the soil; when it is removed, the soil begins to thaw.

1982 TEMPERATURE DATA BY AREA - ALASKA

STATION	HIGH/LOW FOR					AVERAGE FOR					DATE OF LAST SPRING MINIMUM OF		DATE OF FIRST FALL MINIMUM OF		DAYS IN GS
	YEAR	JAN	APR	JUL	SEP	YEAR	JAN	APR	JUL	SEP	≤32°	≤40°	≤40°	≤32°	≥32°
TANANA VALLEY															
Fairbanks Arpt.	87/-43	11/-43	55/-16	87/46	72/25	29	-18	28	63	49	5/16	6/4	8/27	9/23	130
Univ. Exp. Sta.	88/-45	11/-45	45/-18	88/40	71/6	28	-15	28	62	47	6/4	6/11	7/2	8/28	85
Salcha	82/-46	12/-42	55/-26	83/38	70/25	27	-12	25	62	48	5/31	6/21	8/4	9/10	102
Big Delta	84/-50	3/-50	47/-17	84/44	69/26	27	-13	26	60	47	6/4	6/18	8/6	8/27	84
Clearwater	88/-60	5/-57	49/-25	88/35	72/17	25	-17	26	57	47	6/4	6/23	8/2	8/3	60
MATANUSKA VALLEY															
Anchorage	76/-20	26/-20	48/13	74/39	65/28	33	7	33	56	48	5/19	6/4	7/3	9/12	116
PMC-Butte	79/-26	40/-26	53/-6	79/36	67/27	32	-2	35	57	49	5/29	6/24	7/7	9/12	106
Palmer AES	78/-16	29/-16	51/4	78/37	65/30	34	4	33	55	49	5/22	6/21	7/2	9/12	113
Mat. Exp. Sta.	78/-28	31/-28	52/7	78/37	66/28	34	4	34	56	48	5/22	6/21	7/2	9/12	113
Wasilla 3S	78/-16	35/-16	53/9	78/37	70/29	35	6	35	57	50	5/22	6/21	7/1	9/12	113
Talkeetna	84/-30	28/-30	52/2	84/40	63/26	31	1	32	57	46	5/23	6/13	7/3	9/12	112
KENAI PENINSULA															
Homer Arpt.	66/-13	41/-2	46/13	66/43	58/31	36	21	33	53	48	5/13	6/16	9/12	9/23	133
Kasilof	65/-27	30/-27	49/-2	65/28	59/23	31	6	30	51	45	6/21	6/29	7/4	7/10	19
Sterling	74/-29	29/-29	46/0	74/35	59/24	31	1	30	53	44	5/31	6/29	7/1	9/12	104
OTHER AREAS															
Kodiak	76/-8	46/14	56/20	76/39	63/33	41	33	36	55	50	5/16	6/13	7/6	8/10	86
Nome	80/-23	32/-23	36/-16	75/39	67/30	28	11	12	55	45	5/30	6/18	7/23	9/11	104
McGrath	88/-50	25/-50	45/-18	88/41	61/28	27	-12	24	58	45	5/15	6/15	8/4	9/4	112
Juneau Arpt.	85/-7	36/-7	53/17	81/41	63/34	39	14	37	58	50	5/16	6/22	9/8	10/15	152
Haines	90/-5	30/-5	55/22	86/46	65/37	40	12	39	60	52	5/3	5/27	9/9	10/16	166
Kenny Lake	83/-40	2/-40	47/-25	81/35	67/16	26	-13	25	57	46	6/4	6/25	7/2	8/10	66

HISTORICAL TEMPERATURE DATA BY AREA - ALASKA

STATION	RECORD HIGH/LOW FOR					AVERAGE FOR					GROWING SEASON	
	YEAR	JAN	APR	JUL	SEP	YEAR	JAN	APR	JUL	SEP	Avg. No. Frost Free Days 32°	No. of Years Used for Avg.
TANANA VALLEY												
Fairbanks Arpt.	96/-66	50/-66	74/-49	93/34	84/12	26	-12	29	61	44	114	16
Univ. Exp. Sta.	99/-65	47/-65	76/-32	99/29	85/6	27	-8	30	60	45	90	15
Big Delta	92/-63	48/-63	76/-37	91/35	79/7	27	-5	29	59	44	93	8
Salcha	91/-64	49/-64	76/-19	91/33	74/18	28	2	31	61	45	108	16
Clearwater	93/-72	48/-72	74/-32	90/28	74/13	25	-4	30	59	43	56	8
MATANUSKA VALLEY												
Anchorage	86/-38	56/-35	65/-21	83/35	73/19	35	12	35	58	48	140	16
Palmer AES	90/-35	51/-35	69/-17	85/37	72/17	36	18	37	58	49	124	16
Mat. Exp. Sta.	91/-41	51/-40	68/-16	85/31	75/16	35	12	36	58	114	114	16
Wasilla 3S	90/-38	52/-38	68/-8	87/37	76/17	37	19	38	59	49	111	15
Talkeetna	91/-48	45/-48	69/-37	90/26	78/11	33	9	33	58	46	103	15
PMC-Butte	85/-42	51/-40	72/-10	85/36	71/19	36	18	38	58	48	101	8
KENAI PENINSULA												
Homer Arpt.	81/-17	49/-17	60/-7	78/37	66/24	37	21	35	52	47	140	7
Kasilof	87/-45	48/-45	63/-14	83/27	72/15	34	17	34	53	46	59	14
Sterling	87/-40	44/-38	65/-8	87/30	70/15	34	17	35	55	46	75	11
OTHER AREAS												
Kodiak	86/-8	54/-8	59/-7	80/38	72/26	41	30	37	54	50	156	16
Nome	86/-47	46/-47	60/-30	86/31	67/15	26	6	19	50	42	82	15
McGrath	90/-64	54/-64	67/-31	89/33	76/6	25	-9	27	58	44	107	14
Juneau Arpt.	90/-22	57/-20	71/6	90/36	72/26	40	24	39	56	49	134	15
Haines	98/-17	53/-11	74/16	98/35	76/26	41	24	42	58	50	149	13
Kenny Lake	88/-57	44/-57	68/-10	88/30	70/16	28	0	34	57	44	71	5

PRECIPITATION DATA BY AREA (Inches) - ALASKA

STATION	1982 PRECIPITATION							AVERAGE PRECIPITATION							1982 SNOW-FALL
	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL	
TANANA VALLEY															
Fairbanks Arpt.	.93	.96	1.96	2.33	1.67	.77	12.93	.33	.65	1.42	1.90	2.20	1.08	11.23	91.6
Univ. Exp. Sta.	1.22	.68	2.26	4.00	1.83	.62	31.02	.36	.78	1.61	2.31	2.60	1.30	12.90	48.3
Salcha	.82	.42	3.16	3.96	2.00	1.70	10.39	.40	1.07	1.75	2.39	1.92	1.10	11.70	68.6
Big Delta	.55	1.09	2.28	3.57	1.30	.98	11.85	.31	.94	2.20	2.48	1.92	1.23	11.34	40.3
Clearwater	1.06	.73	2.85	2.95	1.07	1.23	15.21	.47	1.54	2.67	2.57	2.38	1.46	16.19	37.8
MATANUSKA VALLEY															
Anchorage	.27	.54	1.56	2.41	2.33	4.66	17.68	.56	.53	1.07	2.07	2.32	2.37	14.68	63.3
PMC-Butte	.44	.44	.81	3.17	1.12	3.16	15.07	1.07	.52	1.54	1.80	1.79	2.67	17.88	63.9
Palmer AES	.35	.58	.67		1.37	4.63	13.15	.90	.63	1.19	1.60	1.03	2.72	14.23	65.2
Mat. Exp. Sta.	.45	.61	.96	3.42	1.21	3.37	14.82	.45	.73	1.64	2.43	2.74	2.28	16.85	45.6
Wasilla 3S	.41	.91	1.74	3.67	1.83	4.72	19.61	.97	.52	1.48	1.88	1.02	2.97	14.17	61.0
Talkeetna	.39	1.31	4.20	5.74	4.55	7.54	31.82	1.12	1.46	2.17	3.48	4.89	4.52	28.64	100.3
KENAI PENINSULA															
Homer Arpt.	.96	.28	.93	1.05	1.10	5.19	20.07	1.09	.71	1.06	1.70	2.56	2.85	22.86	22.8
Kasilof	.18	.72	1.18	1.36	1.76	5.87	16.67	1.15	.59	1.00	1.38	1.37	3.88	17.44	36.2
Sterling	.04	.76	.81	1.38	1.88	2.91	12.66	.81	.60	.83	1.38	1.13	2.66	13.18	30.8
OTHER AREAS															
Kodiak	3.60	5.55	7.29	3.81	2.23	10.10	68.52	3.81	4.35	4.12	3.54	4.30	6.11	56.68	57.9
Nome	.69	1.23	1.55	1.62	1.72	3.72	19.25	.73	.70	.95	2.42	3.57	2.40	16.44	84.7
McGrath	.93	1.17	1.36	3.21	2.73	5.00	22.75	.66	.80	1.70	2.28	3.28	2.14	16.74	107.4
Juneau Arpt.	2.44	5.10	1.86	1.73	5.97	5.10	41.12	2.99	3.31	2.93	4.69	5.00	6.90	54.67	118.5
Haines	3.54	2.27	.20	.69	1.81	5.32	36.68	1.98	2.12	1.06	1.38	1.71	5.10	50.64	104.2
Kenny Lake	.38	.38	.75	1.34	.76	1.20	8.58	.28	.86	1.47	2.27	1.16	1.07	10.74	50.1

SEASON GROWING DEGREE DAYS (Base 40°F) - ALASKA

STATION	May		Jun		Jul		Aug		Sep		Total	
	1982	Avg.	1982	Avg.	1982	Avg.	1982	Avg.	1982	Avg.	1982	Avg.
TANANA VALLEY												
Fairbanks Arpt.	211	226	555	570	713	642	515	477	279	132	2273	2047
Univ. Exp. Sta.	180	220	534	546	682	626	443	477	204	141	2043	2010
Salcha	146	267	456	501	670	645	443	561	228	159	1943	2133
Big Delta	115	263	495	509	620	647	403	521	216	159	1849	2099
Clearwater	164	223	564	460	539	585	409	466	204	110	1880	1844
MATANUSKA VALLEY												
Anchorage	140	192	387	438	496	555	456	493	275	243	1754	1921
PMC-Butte	164	253	417	441	527	557	477	495	258	229	1843	1975
Palmer AES	164	242	417	435	477	549	465	502	267	264	1790	1992
Mat. Exp. Sta.	152	217	402	450	496	543	481	471	249	231	1780	1912
Wasilla 3S	186	267	453	456	527	592	512	546	285	282	1963	2143
Talkeetna	109	146	390	450	527	555	487	453	183	183	1696	1787
KENAI PENINSULA												
Homer Arpt.	59	86	270	257	403	419	391	419	246	237	1369	1418
Kasilof	0	78	213	261	341	415	291	391	135	180	980	1325
Sterling	0	152	240	321	403	468	310	431	120	189	1073	1561
OTHER AREAS												
Kodiak	109	99	276	291	465	437	468	462	297	300	1615	1589
Nome	0	-	276	165	465	313	403	285	153	63	1297	826
McGrath	37	127	456	471	558	564	456	419	156	114	1663	1695
Juneau Arpt.	167	211	489	396	558	487	459	443	309	276	1982	1813
Haines	186	301	567	459	620	549	518	555	345	312	2236	2176
Kenny Lake	50	156	408	397	527	507	403	432	180	129	1568	1621

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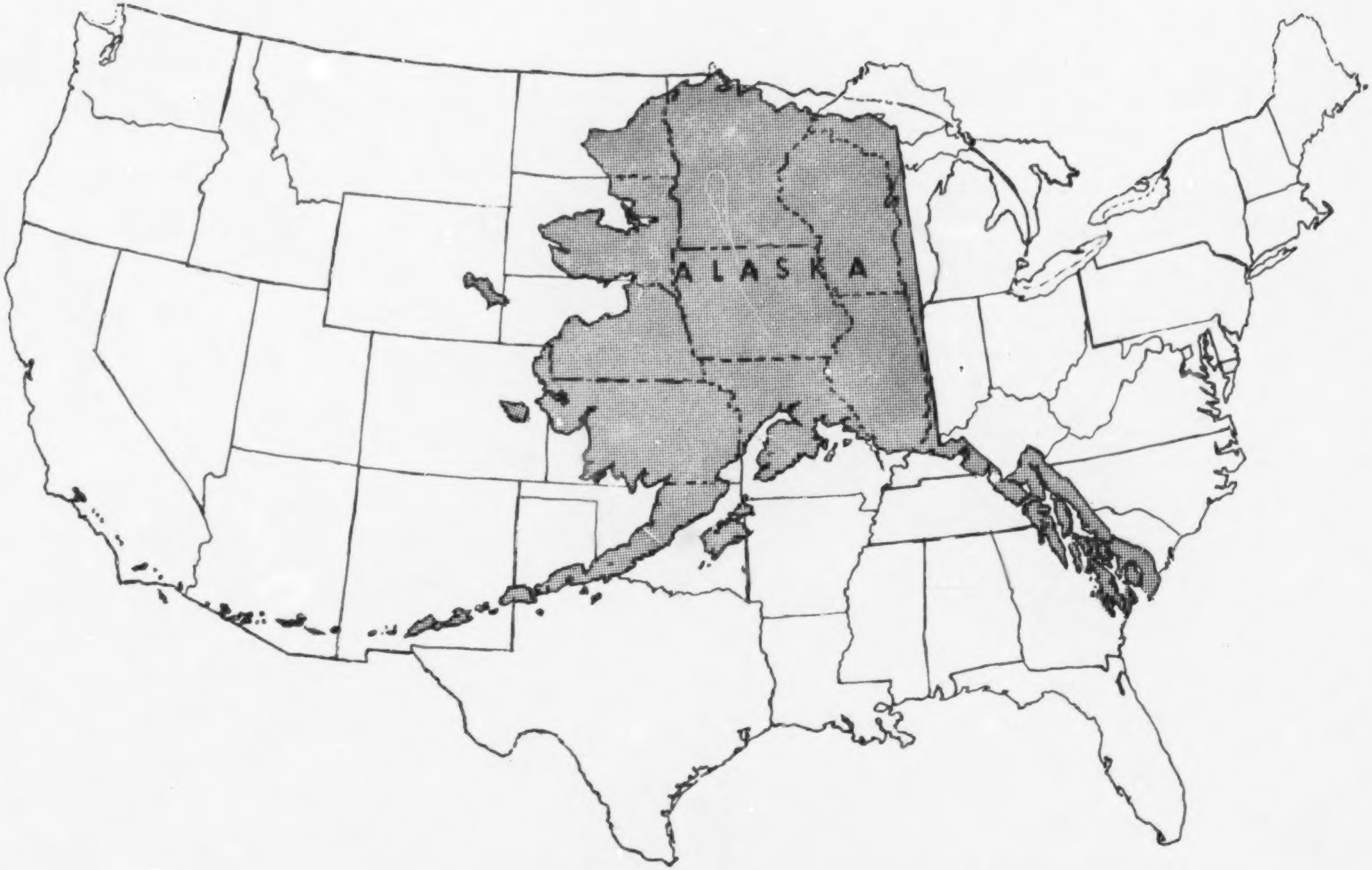

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ALASKA
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THE ALASKA RAILROAD: OVERVIEW AND OPERATIONAL ALTERNATIVES

INTRODUCTION

This **Review** *takes a look at the federally owned Alaska Railroad in the context of its apparent pending transfer to the State of Alaska. After describing the history of the railroad—its present physical plant, rolling stock, and its operations—we analyze the most important issues with which the state must deal: railroad land, employees, finances, competitive environment, and passenger service. We also review organizational structures that might be applied to the railroad following the end of federal control and make recommendations for further action. (See box on page 3 for a brief summary of study findings.)*

The Alaska Railroad (ARR) is unique in that it is (1) the only railroad in North America that is a federal agency, (2) the farthest north railroad in North America, and (3) considered (by some) as a frontier development tool. It has enjoyed a varied history and has alternately been the recipient of intense criticism and extensive federal grants. Originally conceived as a development project in the grand style of the Panana Canal (from which it received much of its early equipment), it quickly fell into disrepute, emerged as a military implement, was converted from pauper to spoiled child, and then allowed to sink into an anonymity which has plagued it to the present day.

The Alaska Railroad is an operating agency of the United States Department of Transportation, Federal Railroad Administration (FRA). As such it is subject to all the obscure federal policies visited upon such agencies, and its operational motivations are both political and economic. However, it has also become an important overland transport link in Alaska and a central element in the state's economic development process.

Changing Federal Policy

During the past decade, FRA has become increasingly interested in transferring ownership of the property to a nonfederal entity. The agency first introduced draft federal legislation to facilitate the transfer in 1971. However, the momentary prosperity of the ARR during the Alyeska pipeline construction project diminished federal interest in disposing of the property.

With the return of "normal" economic conditions in 1978, however, FRA was once again motivated to explore means of relieving itself of the ARR. The economic downturn also coincided with a shift in FRA policy, mainly due to its increasing involvement with Conrail and Amtrak.[1] By 1979, it was apparent that both organizations had become major fiscal and political liabilities for FRA, leading the agency to both a fear of and disinterest in attempts to operate *any* railroad. Thus, FRA's policy tended toward the dissolution of any rail property which

This article was adapted from a report prepared for the Alaska Department of Transportation and Public Facilities, Division of Planning and Programming, by the Institute of Social and Economic Research and Bivens and Associates, Inc.

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[1] Federally controlled railroad properties that had been unsuccessfully managed in the private sector.

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FEATURE

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The Alaska Railroad: Overview and Operational Alternatives

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appeared to be economically marginal, including those controlled by FRA.

This policy, as it pertains to the Alaska Railroad, was first published in ARR's 1979 annual report (in mid-1980):

> Since the Government of the State of Alaska has substantial surplus funds because of the growth of oil revenues, the Federal Government believes that ownership of the Alaska Railroad should be with the State Government. The Federal Government believes the Alaska Railroad exists primarily for the benefit of the residents and shippers of Alaska; they need and deserve a much larger voice in determining the role they want the railroad to play.

This policy received additional emphasis when the Reagan administration took office in January 1981. The transfer of the ARR was consistent with emerging federal orientation in several areas, including (1) replacing a federal function with a local entity, (2) reducing federal employment, and (3) reducing FRA's funding requests.

The policy also supported FRA perceptions that (1) the ARR no longer served the function of a frontier development tool, but had become part of a more mature transportation and economic system, (2) Alaska could afford to operate and subsidize the railroad if necessary, (3) future prospects suggested that private enterprise might find the railroad an increasingly attractive investment, and (4) the ARR could more effectively support public and private objectives under a revised organizational and institutional structure.

To implement these views, FRA once again prepared draft legislation to authorize transfer of the Alaska Railroad to the state. This legislation was introduced into the U.S. Senate on July 17, 1981.

History of the Alaska Railroad

The ARR came into existence through an act of Congress on March 12, 1914. This legislation empowered the President to acquire and (or) construct a railroad, not to exceed 1,000 miles in length, to connect Alaska's interior navigable waterways and one or more coal fields with an ice-free harbor on the Gulf of Alaska. The Alaska Engineering Commission, which had previously located several potential routes, was directed by President Wilson to purchase the 71-mile Alaska Northern Railway and to extend its line from Seward to the head of navigation of Cook Inlet and northward up the Susitna and Chulitna river valleys to a crossing of the Alaska Range near the headwaters of the Nenana River. From that point the railroad was to be built to the confluence of the Nenana and Tanana rivers and upriver to Fairbanks. Two branches were also constructed to tap coal deposits. One branch extended eastward up the Matanuska Valley and the other eastward from the juncture of the Healy and Nenana rivers. This basic system, with minor additions and deletions, has remained intact from its official completion in 1923 to the present (see Figure 1).

Deterioration and Rehabilitation

The decline of placer mining in the Tanana Valley prior to the completion of the railroad, the conversion of naval vessels from coal to oil soon after completion, and the general lack of economic activity along the line combined to produce operating deficits during the first decade and a half of ARR's operation. From 1924 to 1945, the railroad received no operating or capital appropriations from Congress. This resulted in a continuing deterioration of an already marginal physical structure. During the years before World War II, the railroad was maintained to only

SUMMARY OF ISSUES INVOLVED IN ARR TRANSFER

- **Pending Transfer of the Alaska Railroad.** The Federal Railroad Administration (FRA) is presently taking steps to transfer the Alaska Railroad (ARR) from the federal government to the State of Alaska. The FRA proposes to transfer the ARR to the state without charging a direct acquisition cost. However, FRA's proposed legislation also transfers all ARR's liabilities and obligations, which have not yet been clearly defined.

- **ARR Lands.** Lands required for effective railroad operation extend beyond the ARR's rights of way, yards, terminals, and ports, since the railroad requires not only materials-source lands, but also needs to lease lands to traffic-producing tenants. However, much of ARR's land holdings are presently uncertain, because Native claims have been filed on certain portions of it under the 1971 Alaska Native Claims Settlement Act.

- **Railroad Finances.** A 1980 ICC freight rate study of the ARR concluded that the present rates exceed the variable cost of transportation and fully compensate the carrier. In fact, in the past 3 years, even with poor economic conditions nationally and in Alaska, freight transport on the ARR fully met all out-of-pocket costs and some capital costs.

Passenger service, however, has long required subsidization by the freight traffic, and even this subsidy has not been enough. While an increase in passenger fares seems warranted, fares cannot be raised enough to fully meet the cost of passenger service without driving away passengers. This problem would be somewhat alleviated by separating revenue and cost accounting for passenger and freight service. Management needs to establish an aggressive passenger marketing program, moderately increase passenger fares, and request a public subsidy to cover remaining costs of service.

- **Outlook and Benefits of the ARR.** The ARR's freight service, available from Seward and Whittier all the way through Anchorage to Fairbanks, serves the needs of a majority of Alaskans. It is, and will continue to be, an important element in Alaska's transportation system. Not only is it essential to development of many of Alaska's resources, but by competing with nonrail carriers, the ARR assures competitive rates for shippers. Without the rail service alternative, costs of moving commodities would be much higher. And some products, such as large bulk shipment of coal, steel, sand and gravel could not be economically moved at all.

- **ARR Employees.** The ARR has for several years been reducing the numbers of its employees, and a hiring freeze has been in effect since January 20, 1981. As of mid-April 1981, the ARR had 679 employees and 785 authorized positions, a vacancy rate of 17 percent. Freight-user service could suffer should present employment levels persist in an expanding market.

As Department of Transportation personnel, the employees of the ARR have all the privileges and rights of other federal agency personnel. In addition, most ARR employees are members of various labor unions. Enjoying such double protection under existing agreements, employees will not likely wish to relinquish any of their existing rights. As a result, transferring these employees to the state could involve several complex problems.

Meeting all employer retirement and fund contributions for ARR employees will cost about $38 million during the next 20 years (1981 dollars). Or, if we include inflation and salary increases of 10 percent per year (compounded), the cost will total about $195 million, or an average annual contribution of $8.7 million. However, ARR now realizes and could expect to continue to realize adequate revenues from freight service to provide funds for this contribution. Freight revenues could also pay for employee sick leave ($4.3 million) and annual leave ($1.5 million).

- **Condition of Railroad.** The track, structures, and rights of way of the ARR are generally in good condition and well maintained. For the most part, the lines meet or exceed FRA Class IV standards.

The rolling stock and locomotives are generally well maintained and adequate for the traffic carried. However, much of the locomotive and car fleet is old, being previously well used by the military or other railroads. A fleet modernization program may be needed if traffic increases significantly.

Passenger cars are generally well maintained but are old and in need of substantial modernization.

The ARR is generally capable of servicing its equipment; its mechanical and electrical shops are well equipped and adequately support effective maintenance and modification of locomotives and rolling stock.

minimal branchline standards. This condition was aggravated by the fact that "official" completion in 1923 had still left a great deal of work to be done before the system could be considered technically adequate.

World War II provided ARR with a rush of traffic and much-needed income, as well as the now-important link with a second ice-free port, at Whittier. However, the war also accelerated deterioration of the property. Even with military assistance between 1942 and 1945, the railroad was almost physically exhausted by the end of the war. This situation demanded a decision on whether to abandon the railroad or rebuild it. The Federal Government decided to rebuild.

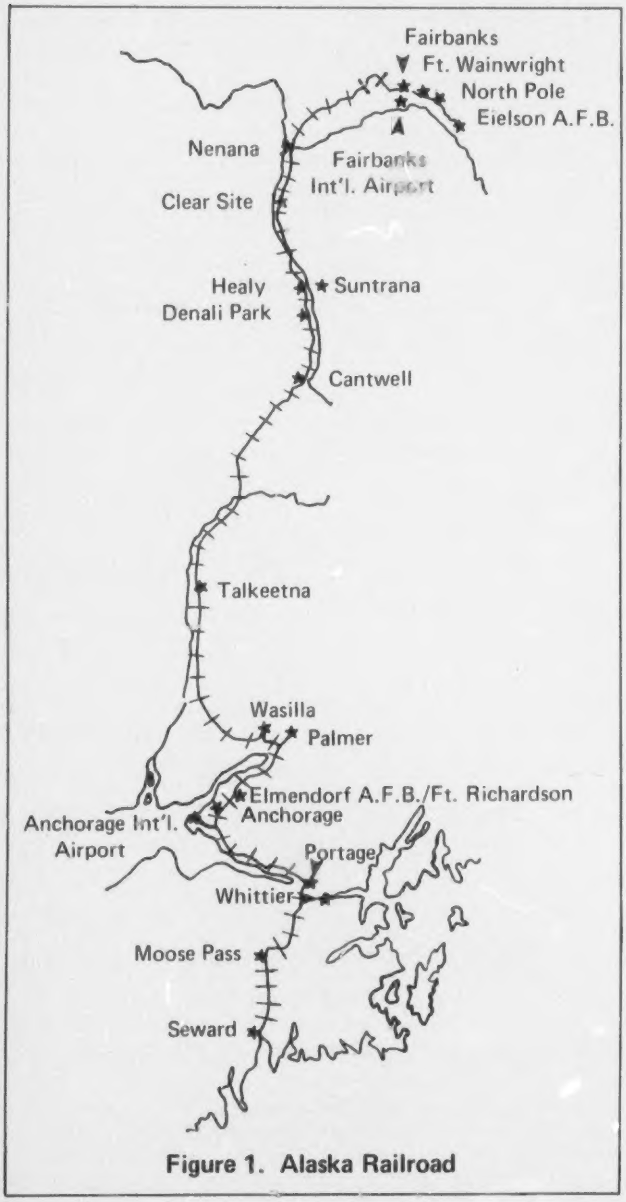

Figure 1. Alaska Railroad

This decision resulted in a project that was to last 30 years and become one of the most controversial episodes in the ARR's history. Actual expenditures began in 1946 and over the construction term amounted to almost $95 million. The actual value of these improvements, however, was considerably greater since much property was transferred at nominal cost from other federal agencies. The rehabilitation included strengthening the roadbed; laying new track; replacing bridges and buildings; buying new locomotives, rolling stock, and maintenance equipment; and building new shops, as well as terminals at Anchorage, Fairbanks, and Seward.

Most of the work, from Whittier to Fairbanks, was completed by 1952; however, the main line to Seward, begun in 1953, was not completed until 1958, and only after a special appropriation was requested by the Defense Department. By the end of the rehabilitation period, the railroad would finally be considered complete and was basically in its present form.

The 1964 Earthquake

Total damage to the Alaska Railroad from the 1964 earthquake amounted to approximately $27 million, of which $25.4 million was obtained through Congressional appropriations.[2] Of the total, almost $11.7 million was required to reconstruct the line from Portage to Seward and the Seward Terminal. Records of the controversy over whether or not the Seward reconstruction should be undertaken indicate that it could not be justified on the basis of capital and future operating costs. However, the Alaska Railroad and its owner, the Department of the Interior, presented funding appeals based on a combination of economic and social factors. One letter stated:

> The decision on reconstruction is not restricted to economic considerations alone; in many respects humane and equitable factors assume even greater significance. The essential fact is that failure to restore rail service means that Seward will disappear as an important factor in Alaska life.

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[2] These appropriations should be clearly distinguished from other federal funds invested in the ARR. The railroad's earthquake rebuilding monies were only a small part of the $400 million in disaster relief assistance provided to Alaska. The vast majority of this money went to individuals, private companies, and local governments through a variety of assistance programs. Thus, for policy purposes, the funding of the ARR reconstruction should be treated in the same light as one would all other economic entities of the state, rather than as a federal agency appropriation.

Given the information available at the time, the decision to rebuild to Seward may or may not have been economically sound. The important point is that as a federal agency, the railroad based a major part of its argument to rebuild the line on factors which were not necessarily in its own economic best interest. A private firm, confronted with the same circumstances, would not likely have used the same reasoning nor have made the same decision.

Railroad Barges and the Port of Anchorage

Shortly before the earthquake, two other events occurred which, together with the subsequent loss of Seward, caused a long-term change in the character of both the railroad's traffic patterns and those of Alaska's entire railbelt region. These were (1) the initiation of railcar barge services between Alaska and both Canada and the continental United States and (2) the opening of the Port of Anchorage to year-round container ship service. Of the two, the most important was the barge service—not in terms of movement volumes, but rather in the options made available to Alaska shippers. The action of the railroad and its barge connections made it possible for the first time to ship directly from the manufacturer or major distributor, wherever his location, directly to an Alaska location without reloading in Seattle and Alaska ports. The economic independence from Seattle wholesalers offered by this service forced steamship companies, particularly Alaska Steamship and Sea-Land Service, to establish similar options.

Construction of the Trans-Alaska Oil Pipeline

The final set of events which shaped the present Alaska Railroad were those surrounding its participation in the construction of the trans-Alaska pipeline. During the years 1974 through 1977, the railroad probably moved the largest, most lucrative volumes of traffic since World War II, and the physical system underwent a similar, although somewhat milder, strain. Once again, the only possible solution, given the federal agency status of the railroad, was to transfer property from other federal organizations (most notably locomotives from the military) and to use Congressional appropriations for capital improvements and major maintenance. Twenty-four million dollars in appropriations, in addition to $13 million in improvements financed through earnings, permitted the railroad to emerge, for the first time, from a period of heavy usage in better physical condition than it entered.

THE PHYSICAL PLANT

The Main Line and Branches

The Alaska Railroad (ARR) today has a single track mainline of 419 miles from Whittier to Fairbanks via Anchorage, Wasilla, Healy, and Nenana. In addition, there are six branches with an aggregate total of 115 miles. These include the 28-mile branch from Fairbanks to Eielson, the 10-mile Fairbanks International Airport spur from Ft. Wainwright to the airport, the 4-mile coal branch from Healy to Suntrana, the 7-mile line from Matanuska Junction to Palmer, the 3-mile Anchorage International Airport spur, and the 63-mile line from Portage to Seward.[3]

The mainline has only mild gradients along the water level route between Whittier and Anchorage and up the Susitna Valley as far north as Gold Creek (about 150 miles from Anchorage). However, the severe grades on the next 35 miles to the summit of the pass through the Alaska Range reduce the tonnage ratings of locomotives by about 40 percent. The grades on the north side of the range are much easier, being similar to the water level line in the lower Susitna Valley, with the exception of a single short five-mile stretch. The mainline north of the range to Fairbanks and the Eielson branch pass through generally rolling country with mild gradients.

The most severe portion of the railroad is the line from Portage to Seward, which crosses two mountain barriers with steep gradients. Both restrict southbound traffic, reducing the tonnage a locomotive can handle by 75 percent and 65 percent, respectively, when compared with what can be moved between Anchorage and Portage. Northward grades are slightly milder but still are more demanding than any of the line north of Portage.

Passing sidings are spaced about every 7-to-10-miles so that trains may meet and pass. However, sidings long enough to accommodate most freight trains are less frequent. In addition, there are tracks at various points along the line which serve industries not located at a major yard. Table 1 summarizes the physical features of the mainline and principal branches.

Track Conditions

The track structure of the Alaska Railroad is currently in excellent condition, particularly considering the relatively light traffic. The main line and the line to Seward are maintained to FRA Class IV quality standards which permit freight trains speeds up to 60 miles per hour and passenger trains to 80 miles per hour, if certain safety conditions are met. In fact, the Alaska Railroad must limit its train speeds

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[3] It should be noted that the railroad considers the line to Seward as part of the main line, and it is maintained to these standards. However, it has the lightest traffic of the entire system (about 300,000 gross tons annually).

Table 1

Summary of Alaska Right-of-Way Characteristics

Line Segment	Distance	Tonnage Rating Northbound[a]	Tonnage Rating Southbound[a]	Passing Sidings over 3000 ft.	Industrial Tracks Between Stations[b]
Seward-Divide	9.1	875	4,000	0	0
Divide-Primrose	6.4	1,600	850	0	0
Primrose-Hunter	21.6	1,600	4,000	2	3
Hunter-Grandview	4.9	900	4,000	0	0
Grandview-Spencer	10.9	4,000	640	1	2
Spencer-Portage	8.4	4,000	3,000	1	0
Whittier-Portage	12.4	2,600	3,000	1	0
Portage-Potter	36.4	4,000	3,000	1	0
Potter-Anchorage	13.7	2,000	2,500	1	22
Anchorage-Matanuska	36.4	1,850	3,000	3	5
Matanuska-Palmer	6.5	2,000	4,000	0	6
Matanuska-Goldcreek	112.5	1,850	2,500	8	9
Goldcreek-Hurricane	18.2	1,100	2,500	0	0
Hurricane-Honolulu	7.3	1,100	1,325	1	0
Honolulu-Colorado	8.4	1,100	1,800	1	0
Colorado-Summit	15.4	1,800	1,800	1	1
Summit-Healy	45.6	2,700	1,800	1	6
Healy-Nenana	53.6	4,000	1,800	1	7
Nenana-Fairbanks	58.6	3,000	3,000	4	4
Fairbanks-Eielson	28.0	3,000	2,000	0	9
Yards:	Seward Nenana	Healy Anchorage	Whittier Fairbanks		

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[a] Tonnage ratings for 3,000 horsepower locomotives.

[b] Additional industrial tracks in yards, at military bases (Ft. Richardson, Elmendorf, Eielson, Ft. Wainwright), and at Anchorage and Fairbanks International Airports.

Source: Alaska Railroad, Timetable No. 109.

for freight and passenger trains to 49 and 59 miles per hour, respectively, since it has no automatic block signal system, one of the FRA safety requirements for higher speeds. In addition, the number of sharp curves places further speed limitations on some sections of the line. These allow the railroad to follow the contour of the land in more mountainous areas so that the relatively mild gradients (which are extremely important to efficient operation) can be maintained.

Tracks, Bridges, and Yards

The track and bridges of both the main line and the Seward line are maintained to accommodate cars carrying a load of up to 100 tons, although the Eielson and Suntrana branches have lower loading limits. Present operation plans call for limiting 100-ton capacity cars to 80 tons when they are used to move bulk products, such as coal and gravel. This is due to the excessive track wear caused by trains composed entirely of 100-ton capacity cars.

The railroad also operates and maintains a number of yards to serve local industries, sort cars, and to maintain its equipment. These vary considerably depending on the purpose for which they are used. The yard at Seward serves the railroad-owned port facilities at that location and includes a number of car marshalling tracks, a small equipment maintenance facility, the dock facilities, and several tracks to local industries. Whittier is designed and used differently; since it is the interchange point for railcar service, the facility is primarily designed to serve the two railroad-owned car-barge slips. Secondarily, facilities in Whittier include those for the Whittier-Portage passenger-auto shuttle service and those for the military dock and petroleum terminal.

Anchorage has the railroad's major classification yard, locomotive and car maintenance shops, headquarters, and some car storage facilities. The yards also serve a number of major and minor industries including the Anchorage Port, Elmendorf Air Force Base, and Fort Richardson. There are also container-on-flatcar and trailer-on-flatcar facilities in Anchorage.

Healy has a small yard and locomotive service facility and exists primarily to serve the nearby coal mines. The Nenana yard exists solely to serve the railroad's small river port in that town and several other local industries. Fairbanks contains a small classification yard, limited locomotive and car shops, and trackage to serve local industrial facilities. The yard is also the base for service to Fort Wainwright and Eielson Air Force Base, as well as the North Pole Refinery.

Equipment

The Alaska Railroad uses a variety of equipment to produce revenue and maintain the property. The largest and most costly units are the locomotives—the railroad has sixty-five, with an average age of 18.7 years. The most modern of the units are the fifteen 3,000-horsepower road-switcher locomotives built by General Motors between 1975 and 1978. These are comparable to the most modern equipment on any railroad. Ten older 1,600-horsepower road-switcher locomotives were completely rebuilt in 1977 and have a useful efficient life at least through 1992. Four other 2,500-horsepower road switchers acquired in the mid-sixties are old enough to be eligible for complete rebuilding, and one has already been rebuilt. Of the remaining thirty-six units, most were built between 1951 and 1953, and only about ten to twelve are usually in service under present traffic conditions.

Seven of the older car-body type locomotives are used in passenger and mixed train service between Anchorage and Fairbanks, while several ex-military road switchers are used in Anchorage yard service and as backup yard engines around the system. Several of the car-body types might be usefully rebuilt if passenger service is continued. However, the ex-military units are probably near the end of their useful lives. Several of the older locomotives of both types are being cannibalized to provide parts for the others.

The freight car fleet numbered 1,754 units in 1980, with an average age of 32 years. Table 2 shows the distribution of freight cars by functional type. Clearly, the freight car roster is dominated by the open types, including the flat cars, gondolas, open hoppers, and dump/ballast cars. This is consistent with the types of traffic being handled with most of the tonnage consisting of bulk materials, such as coal, gravel, logs, and pipe along with trailer- and container-on-flat-car (TOFC/COFC) service. Another important component of the car fleet available to ARR are the tank cars, particularly the privately owned cars leased to oil companies served by the railroad and used for petroleum product distribution throughout the railbelt.

Table 2

Alaska Railroad Freight Cars

Car Type	Number	Most Recent Year Built	Number Built in Most Recent Year
Box	235	1965	34
Flat	389	1976	100
Gondola	394	1943	395
Hopper, Open	348	1981	25
Hopper, Covered	21	1970	9
Tank	139	1970	3
Refrigerator	16	1966	11
Dump and Ballast	157	1958	27
Caboose	27	1977	3
Other	28	1943	2
Subtotal	1,754	1981	
Privately Owned Cars Assigned to Alaska Railroad			
Flat	52	1979	8
Tank	230	1980	16
Subtotal	282	1980	
Total	2,036		

Source: Alaska Railroad 1980 Annual Report and Alaska Railroad Equipment Summary.

Of particular concern is the age of much of the ARR's own fleet and the limited capacity of many of the units. Only 340 cars have been purchased new since 1960 and only 140 cars since 1970. Even though the fleet has been well maintained, maintenance will become more costly as the cars continue to age. The aging problem also creates problems in ARR's interchange of traffic with other railroads. Federal safety standards limit the age of equipment which may be used in interline service. Some of ARR's equipment is already prohibited from participating in this traffic, while other cars are allowed to operate only with waivers.

The limited capacity of some cars could be detrimental to the railroad, particularly for transportation of some future bulk shipments. This is also a difficulty with ARR's tank car fleet (although the private cars assigned to ARR are modern units). With a few exceptions, however, this factor does not appear to limit service of existing traffic.

Table 3

Alaska Railroad Passenger Cars

Type	Number Owned	Number Leased	Average Age
Coach	21	–	29
Dome Coach	3	4	26
Combination Passenger/Baggage	3	–	36
Food Service & Recreation	10	2	27
Baggage	6	–	20
Power Cars	4	–	38
Business Car	1	–	24
Total	48	6	26

Source: FY 1980 Annual Report, The Alaska Railroad.

The passenger car fleet consists of 48 units owned by the ARR and 6 leased from Amtrak for supporting the increased 1981 summer service. Table 3 shows the types and ages of the present equipment. Although not as old as the railroad's freight fleet, the passenger cars are an aging asset which will require a complete rebuilding if the present level of service is to be continued. Twenty-eight of the cars were acquired from the Union Pacific Railroad in 1971, eight came from the Southern Railway in 1980, and the remainder were rebuilt from surplus military hospital cars. In recognition of the need to extensively rebuild the current fleet, if passenger service is to continue, the railroad currently has ten cars being rebuilt under contract to General Electric.

In addition to revenue-producing equipment, the ARR also has 205 units of maintenance and emergency equipment. This includes such items as snow plows, cranes, and cars for housing mobile maintenance forces. This is supplemented by a considerable fleet of on- and off-track machinery used in maintenance and in-house construction work. Also, sufficient shop facilities and machinery are available to perform any level of maintenance required by the car and locomotive fleets; however, space and personnel limitations sometimes preclude programming a large volume of heavy repair or rebuilding work over a short period. Therefore, large projects, such as the previously mentioned passenger car rebuilding may be contracted to outside firms.

OPERATIONS

Clearly, the purpose of ARR's equipment is to provide train service to the railroad's customers. Since rail operations provide the ARR's largest proportion of revenues, they are thus of special interest to this study. Table 4 lists the types of trains operated by the ARR and the number operated in the years 1976-1980; Table 5 indicates the total train miles produced by these trains on each segment of the railroad. Currently, the service can be categorized as follows:

1. Anchorage—Fairbanks — Passenger and mixed train service
2. Anchorage—Fairbanks — Freight service
3. Healy—Fairbanks — Coal trains
4. Anchorage--Palmer — Gravel trains
5. Anchorage—Whittier — Freight service
6. Anchorage—Whittier — Passenger shuttles
7. Anchorage—Seward — Freight service
8. Anchorage and Fairbanks industrial switching trains

Table 6 summarizes the present frequency of these operations along with the winter schedules for the same services. As can be seen, frequency of operation can vary considerably, particularly for the passenger and gravel trains. This leads to equipment utilization problems in that a sufficient number of cars and locomotives must be on hand to meet peak conditions but some can be expected to be surplus during slack seasons. This is aggravated by the difficulty that ARR, as a federal agency, has in

Table 4

Approximate Number of Trains Operated

(All are roundtrips unless otherwise noted)

Service	1980	1979	1978	1977	1976
Anchorage-Seward Freight	46	53	46	68	132
Anchorage-Whittier Freight	129	123	158	187	122
Anchorage-Palmer Local Freight	32	32	38	36	37
Anchorage-Palmer Gravel Trains	102	146	158	187	235
Anchorage-Fairbanks Freight	181	192	213	271	340
Anchorage-Fairbanks Mixed[a]	74	70	70	69	71
Fairbanks-Healy Coal Trains[b]	145	139	139	156	191
Fairbanks-Eielson Industrial Switchers[b]	260	243	243	260	330
Anchorage Airport Industrial Switchers[b]	295	260	260	277	295
Anchorage-Fairbanks Passenger	126	114	114	114	111
Anchorage-Whittier Shuttle Trains	226	222	221	234	209
Special Passenger Trains	14	13	10	–	–

[a] A mixed train includes both freight and passenger service in the same train.

[b] Estimates based on information provided by Alaska Railroad officials.

Source: Crew Call Sheets as computed by Interstate Commerce Commission; conversations with Alaska Railroad officials.

leasing supplemental equipment, a strategy common throughout the rail industry in such circumstances.

Also of interest is the changing traffic pattern that has been occurring during the past 5 years (Table 4). Since costs to operate additional trains (above some minimum level) do not rise as fast as the number of trains and while revenues tend to increase directly with the number of revenue trains, it is evident that the cyclic nature of Alaska's economy very directly affects ARR's net income. Table 4 graphically illustrates the difficulties faced by the railroad's management during the last 3 years of declining and stagnating economic activity.

Table 5 also shows the large part that passenger service plays in ARR operations. With passenger and mixed train service accounting for 48 percent of the 1980 train miles, it is obviously an important element in the cost structure of the railroad.

The length of ARR trains varies considerably by type of service. Freight trains to Seward generally comprise 40 to 60 cars while those to Whittier are 45 to 50 cars, depending on which barges they are meeting. The unit gravel trains between Anchorage and Palmer consistently have either 60 or 80 hopper cars each. The Anchorage-Fairbanks freights range between 60 to 100 cars, and the Healy-Fairbanks freights range between 40 to 60 cars. The mixed trains between Anchorage and Fairbanks will have 2 to 6 passenger and 20 to 25 freight cars while summer passenger trains have 6 to 10 cars. In a particular circumstance, maximum train length may be dictated by length of passing sidings, traffic demands, locomotive availability, union agreements, grades, barge capacity, or climate.[4]

Table 5

Approximate Revenue Train Miles

Rail Segment/Service	1980	1979	1978
Healy-Fairbanks/			
Freight	66,163	67,654	64,953
Mixed	15,259	16,157	16,157
Passenger	28,274	24,908	24,908
Anchorage-Healy/			
Freight	97,103	106,123	119,876
Mixed	33,156	35,107	35,107
Passenger	61,437	54,248	54,124
Anchorage-Whittier or Seward/			
Freight	27,205	26,968	29,526
Passenger	38,054	37,166	35,913
ARR Total/			
Freight	190,471	200,745	214,355
Mixed	48,415	51,264	51,264
Passenger	127,765	116,322	114,945
Total	366,651	368,331	380,564

Source: Computed by Interstate Commerce Commission from Train Mile Reports.

Table 6

Alaska Railroad Train Service
(in trips per week)

Service	Summer 1981	Winter 1981-82
Freight		
Anchorage-Fairbanks	4	5
Anchorage-Seward	bi-monthly	1
Anchorage-Palmer/Local	bi-monthly	–
Anchorage-Palmer/Gravel	20	–
Healy-Fairbanks	3	5
Anchorage-Whittier/AHT[a]	every 5 days	1
Anchorage-Whittier/CNR[b]	every 9 days	bi-monthly
Mixed		
Anchorage-Fairbanks	3	1
Passenger		
Anchorage-Fairbanks	7	–
Anchorage-Whittier	9	3

[a] AHT = Alaska Hydro Train Railcar Barges.

[b] CNR = Canadian National Railway Railcar Barges.

Source: Alaska Railroad officials.

Traffic Base

The ARR transports only a few commodities between a small number of origins and destinations. ARR traffic logically divides itself into two basic components: local and interline. Of the two, the local movements (strictly ARR origins and destinations) generate the most tonnage but relatively low levels of revenue per ton-mile. The interline traffic is that interchanged between ARR and either Alaska Hydro-Train or Canadian National Railway through the car-barge facility at Whittier or the trailer and container movements through the Port of Anchorage that are forwarded by the railroad.

Local

Tables 7 and 8 show the revenue tons transported by the railroad and the resulting revenues. As can be seen, the two consistently largest movements are (1) the coal moved from Healy to power plants at Clear Air Force Station, the University of Alaska in Fairbanks, Fairbanks, Fort Wainwright, and Eielson Air Force Base and (2) the gravel moved from Palmer to the three largest aggregate companies in Anchorage. Both are fairly short hauls and involve

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[4] In the winter, decreased airbrake response time and increased train friction may limit length.

Table 7

Freight Traffic Revenue Tons Carried
(in thousands of tons)

Commodity	1981	1980	1979	1978	1977
Coal	653.0	590.2	523.9	593.3	550.0
Sand & Gravel	1,796.8	396.2	637.5	727.2	699.5
Petroleum	399.1	251.7	219.6	373.9	532.3
Forest Products	100.7	108.8	55.2	67.8	82.0
Manufactured Products	311.9	292.1	276.9	305.9	326.7
TOFC/COFC*	112.5	92.4	88.7	99.5	99.7
Other	8.1	9.9	7.1	10.1	15.1
Total	3,362.1	1,741.3	1,808.9	2,177.7	2,305.3

*Trailer-on-flatcar/Container-on-flatcar.

Source: Alaska Railroad Annual Reports.

commodities of relatively low value.

Petroleum products represent the most lucrative of the larger, local movements. Since the construction of the North Pole refinery, this traffic has consisted principally of gasoline moving from Anchorage to Fairbanks. However, there has recently been a growth in the opposite direction in movements of jet and diesel fuel supplies from North Pole refinery to distributors in Anchorage and to the Anchorage International Airport. The railroad also delivers fuel to Fairbanks International Airport and the Anchorage Airport from sources other than North Pole.

The other significant intrastate movements include logs from Nenana to Seward,[5] cement from Anchorage to Fairbanks, pipe from either the Seward or Anchorage ports to Fairbanks for forwarding to the North Slope, and a limited amount of local trailer-on-flatcar business between Anchorage and Fairbanks.

Interline Traffic

Interline traffic differs considerably from local traffic. A major component is trailer-on-flatcar and container-on-flatcar traffic forwarded by the railroad on substitute service agreements with Totem Ocean Trailer Express and Sea-Land Service Company between Anchorage and Fairbanks. While this traffic amounts to only 90,000 to 100,000 tons annually, it carries a premium rate because of its time sensitivity and long distance. This traffic produces almost as much revenue as the much larger coal movement. It is time competitive with over-the-road movements and generally carries a lower tariff than motor carriers offer.

The railroad port at Whittier receives the larger part of the interline business. This traffic is composed of all types of consumer and industrial goods including building products, furniture, chemicals, oil field service equipment, fertilizers, machinery, vehicles, foodstuffs, and other goods. Most of those cars with west coast origins arrive aboard Alaska Hydro-Train (AHT) barges from Seattle. However, cars from mid-western, eastern, and Canadian origins tend to move through Prince Rupert via Canadian National Railway (CNR) and the barges they operate. The AHT movements total 200,000 to 300,000 tons annually while CNR moves about 30,000 to 40,000 tons. While these two comprise only 10 to 15 percent of ARR's total traffic tonnage, they generate between 30 to 40 percent of the revenues because of the value of traffic and the proportion of the total that moves fairly long distances. Presently about 50 percent goes to Anchorage while the remainder goes to Interior or Kenai Peninsula points.

Several characteristics of ARR traffic are important to understand because they define both the present and likely future markets which the railroad will serve. The railroad, as an instrument of mass movement, is generally oriented toward industrial rather than consumer customers; it provides most of its services to a limited clientele which has direct siding access to the system. It should be remembered that rail service is attractive to a relatively limited number of shippers; however, these shippers usually comprise the basic elements of Alaska's economy, such as petroleum production and refining, mining; construction; timber; the military; wholesaling;

Table 8

Freight Traffic Revenue
(in thousands of $)

Commodity	1981	1980	1979	1978	1977
Coal	$4,637	$3,717	$3,207	$3,507	$3,115
Sand & Gravel	2,712	556	1,009	972	879
Petroleum	6,700	4,691	3,877	6,362	11,514
Forest Products	1,734	1,253	886	2,131	1,402
Manufactured Products	13,631	8,225	6,738	8,370	8,691
TOFC/COFC*	4,414	3,054	2,327	2,434	2,639
Other	181	168	114	115	244
Total	34,009	21,664	18,158	22,991	28,483

*Trailer-on-flatcar/Container-on-flatcar.

Source: Alaska Railroad Annual Reports.

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[5] This movement ceased in early 1981 with the collapse of the Japanese housing market.

and, potentially, heavy manufacturing, agriculture, and chemicals. Thus, the railroad tends to serve only those organizations which ship in sufficient quantity to make use of the discounts offered by carload, multi-carload, or trainload tariffs. For local traffic, this implies that the primary shippers will be the very largest industries in the railbelt, particularly those related to energy, construction, and resource development. This is particularly true given the small size of Alaska's heavy manufacturing and agriculture sectors. Should these two traditionally rail-oriented groups develop into a significant force in the state, they would become important revenue sources for ARR.

The interline traffic, particularly the railcar movements, is a bit more complex. For these movements several factors are important in determining the appeal of rail service. While the ability to order in carload or greater amounts is important, several other factors also influence the shippers' choice of mode. An important characteristic of many of these movements is that they involve commodities which are either not produced or wholesaled in the Seattle area or which can be procured more inexpensively by going beyond Seattle and dealing in sufficiently large quantities. This is particularly important for the Canadian National traffic. Another important feature of these movements is that they usually involve commodities which normally move by rail on the continental rail system, thus, making it attractive to avoid an additional set of loading and unloading changes at the port of embarkation. A fourth characteristic of considerable importance is the distance of a shipper's plant or warehouse from a rail siding. Only 5 to 10 percent of railcar shipments are distributed to their consignee from a central public warehouse or forwarding facility by truck, and these usually to the smaller, more infrequent shippers.

Together, these factors define a fairly narrow market to which ARR's interline service can appeal. However, as noted earlier, it is a very important market. It is also a fairly volatile one which varies considerably with the levels of activity in specific industrial economic sectors (i.e., construction), rather than being oriented toward the more stable consumer sector. While innovative marketing can stabilize these patterns somewhat and also potentially increase market share, it is unlikely that it can penetrate more than 30 percent of the U.S.-Railbelt Alaska trade without a significant shift in the texture of the Alaska economy or a dramatic change in competition. It is also notable that ARR's ability to enlarge its share of the market is limited by the capability and number of railcar barges which private operators have available and are willing to commit to the service.

Outlook

During the next 3 to 5 years the railbelt economic prospects provide considerable encouragement for the stabilization of the railroad's freight operations at a sufficiently high level to keep it viable. There are enough moderate-to-large-scale construction projects to provide firm prospects for a continuing high level of traffic. In addition, the prospect of moving 800,000 metric tons of coal annually from Healy to a Seward export terminal provides an important long-term, as well as seasonal, element of stability. It is also the type of movement for which the railroad is ideally suited. It adds significantly to revenues without proportionally increasing costs by utilizing already existing capacity and capabilities.

MAJOR RESTRUCTURING ISSUES

Clearly, there is much more to the Alaska Railroad than simply the enumeration of the physical and operational features indicated above. Its land holdings, employees, finances, competitive and regulatory environment, and passenger service must also be considered in any restructuring of the property. These issues have emerged as being the most critical now being faced by the state or any new potential owner or operator of the Alaska Railroad.

Land

The following discussion down through "Native Village Selection Area Claims" page 14, was prepared by the Office of General Counsel of the Federal Railroad Administration.

Land is perhaps the most valuable fixed asset currently controlled by the Alaska Railroad (ARR). It is also an extremely important asset for operation, maintenance, and traffic development purposes. The total lands under control of the railroad are about 38,000 acres. The ARR has acquired its land through executive order, public land order, purchase, trade, and BLM trust deed. The earliest acquisitions were in 1914—the latest (.2 acres), in 1970. While these holdings are not extensive, they are among the most valuable industrial lands in Alaska. Of the total lands, about 12,000 acres are used for the right-of-way. The remaining 26,000 acres are used or reserved for marine and rail terminals, gravel resources, right-of-way erosion protection, industrial leases, gravel and rock reserves, railroad administration, and future development and facility expansion. Since the Alaska Native Claims Settlement Act of 1971 (ANCSA), both the ownership and use of these lands has been clouded. Table 9 indicates the location and quantities of land and the Native villages that have filed claims against particular parcels.

The railroad land holdings fall within seven

Native village selection areas and four Native regions that were established by ANCSA. Approximately 8,035 acres of railroad land, or 21 percent of the total holdings, are located in Native village selection areas and are potentially subject to claims by Native village corporations. Substantially all railroad land, whether or not located in a Native village or regional area, may ultimately be claimed by Cook Inlet Region, Incorporated (CIRI) under the special authorization that allows CIRI to select land outside its regional boundaries.

Right-of-way Lands

The main line right-of-way from Seward to Fairbanks was established by executive order in 1915.[6] The right-of-way lands of two small, private railroads were purchased to form the first 70 miles north from Seward and part of the right-of-way approaching Fairbanks. The balance of the original right-of-way was reserved from public domain by the Alaska Engineering Commission under authority of the Alaska Railroad Act and the 1915 executive order. Other public lands have been acquired over the years and now provide branch line connections to Palmer, Whittier, and other towns. Spur lines have been constructed to provide access to airports and coal fields along the railbelt. Defense lands have been transferred to the railroad for construction of rail lines into several defense installations. The railroad has also purchased some right-of-way lands from private individuals or from state and local governments. The right-of-way is mostly 200 feet wide, with some variations. The right-of-way is wider at several locations where needed for control of washouts and for steep cuts and fills. Narrower rights-of-way are common on several spur lines where the railroad passes through military reservations or where other factors hindered the acquisition of a full 200-foot right-of-way.

Non-Right-of-Way Lands

The 26,521 acres of railroad land other than right-of-way lands were acquired by executive orders, public land orders, transfers, purchases from private owners, and by trade for other lands with state and local governments. These land parcels range in size from 0.4 acres up to 5,830 acres at twenty-seven locations adjacent to the right-of-way and three smaller locations off the railbelt. These lands were acquired to support operation of the railroad. About 1,000 acres were leased to businesses which provide lease revenue and generate rail traffic for the railroad. Another 9,000 acres are used as active gravel and rock quarries or 425 held for the railroad's future gravel and rock needs. Other parcels are used for storage, maintenance, and terminals. About 100 acres are used for the operation of the Yutana Barge Line at Nenana and another 570 acres are part of the Seward and Whittier port and terminal facilities. The largest three parcels are located in the remote areas of Curry (4,970 acres), Midway (3,811 acres), and Healy (5,830 acres). These large parcels are mostly vacant and are held by the railroad for controlling watershed, providing gravel resources, and allowing future development or expansion of the railroad.

The three pieces of land not adjacent to the right-of-way are a presently leased 50-acre parcel in Valdez that was used to handle railcars from oceangoing barges in support of the Alaska oil pipeline construction and two parcels totaling 60.4 acres (60 acres at Holy Cross and 0.4 acres at Tanana) that are leased as docking and storage areas by Yutana Barge Lines.

Native Village Selection Area Claims

Table 9 shows railroad lands that are located within Native village selection areas. Claims have been filed by Native village corporations for virtually all railroad lands that lie within these areas. The extent to which these lands will ultimately be conveyed to the village corporations will depend on determinations made by the Department of the Interior as to which lands are actually used by the railroad and, therefore, exempt from selection under section 3(e) of ANCSA. The Department of the Interior published final 3(e) regulations that went into effect in late 1980, setting narrow standards for determining which lands are actually used by the railroad. Under the regulations, the railroad would not retain any leased land or gravel reserves claimed by a Native corporation, and the railroad's right-of-way would be converted into a limited easement right across land that would be conveyed to the Native claimants. In the first major claim for railroad land within a village selection area, the Federal/State Land Use Planning Commission (LUPC), an advisory body established by ANCSA, recommended that 90 percent of the railroad's land holdings claimed by the Eklutna Village Corporation should be conveyed. This recommendation includes all leased lands, all right-of-way lands, and substantially all gravel reserves and would leave the railroad with only a small storage yard and one gravel pit in this area. The railroad would retain only 240 acres out of its present 2,700 acres in this area. Although the 3(e) regulations are now final, the Department of the Interior has neither formally ruled on

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[6] Executive Order No. 1, April 10, 1915.

Table 9

Alaska Railroad Lands

Location	Total Acres	Acres Leased (Annual Lease Revenue)		Acres Containing Gravel & Rock Reserves (Est. Cubic Yards in Ground)		Acres Within Native Selection Area (Name of Native Village)	
1. Seward	299	55	($123,000)		——	——	
2. Crown Point	81	1	($1,600)		——	——	
3. Moose Pass	5.6		——		——	——	
4. Portage	900		——		——	——	
5. Whittier	272	15	($3,500)	100	($150,000)	——	
6. Anchorage	661	332	($1,500,000)		——	——	
7. Eagle River	1,800	0.1	($9,400)	1,450	(9,000,000)	1,800	(Eklutna)
8. Birchwood	251		——	150	(1,800,000)	251	(Eklutna)
9. Eklutna	343		——	343	(2,300,000)	343	(Eklutna)
9a. Eklutna-BLM Gravel Reserve	301		——	301	——	301	(Eklutna)
10. Matanuska	199		——		——	199	(Eklutna)
11. Pittman	145		——	145	(2,100,000)	145	(Eklutna & Knik)
12. Willow	56		——		——	——	
13. Gravel Pit	215		——	215	(2,200,000)	——	
14. Talkeetna	144		——		——	——	
15. Curry	4,970		——	1,200	(10,000,000)	——	
16. Gold Creek	26		——		——	——	
17. Chulitna	100		——	100	(1,500,000)	——	
18. Midway	3,811		——	1,000	(3,900,000)	——	
19. Colorado	44		——	44	(650,000)	——	
20. Broad Pass	1,070		——	600	(1,600,000)	630	(Cantwell)
21. McKinley Park	18.4	0.3	($5,700)		——	——	
22. Healy	5,830	101	($13,380)	600	(5,200,000)	——	
23. Lignite	1,260	278	(2,400)		——	——	
24. Clear	2,780		——	2,780	(40,000,000)	640	(Nenana)
25. Nenana	279	104	($221,000)		——	279	(Nenana)
26. Fairbanks	461	92	($250,000)		——	——	
27. Holy Cross	60	4	($1)		——	60	(Holy Cross)
28. Tanana	0.4		——		——	0.4	(Tanana)
29. Moose Creek	89		——		——	89	(Eklutna)
30. Valdez	50	17	($41,250)		——	——	
Subtotal	26,521.4	999.4	($2,171,231)	9,028	(80,400,000)	4,737.4	
% of Subtotal		3.8%		34.0%		17.9%	
		Right-of-Way Lands				2,863.9*	
Seward-Fairbanks	10,677.2	——			——	——	
Portage-Whittier	184	——			——	——	
Fairbanks-Eielson	470.3	——			——	——	
Healy-Suntrana	111.5	——			——	——	
Matanuska-Chickaloon	434.1	——			——	434.1*	
Subtotal	11,877.1					3,298	
% of Subtotal	27.8%						
TOTAL	38,398.5					8,035.4	
% of TOTAL						20.9%	

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*Right-of-way miles in village selection area: Nenana, 40.5 miles; Cantwell, 38.7 miles; Knik, 3.5 miles; Knik and Eklutna, 43.8 miles; Eklutna, 30.6 miles; Chickaloon, 27.3 miles.

Source: Alaska Railroad records.

the Eklutna claim nor begun to process other claims. However, Department of the Interior officials in Alaska and Washington, D.C. have indicated a willingness to accept the bulk of the LUPC's recommendations. Selections of railroad land in other village areas are expected to follow the outcome of the Eklutna claims. If the result for all railroad land located in village selection areas follows the LUPC recommendation, the railroad would lose up to 90 percent of its lands located in village selection areas. This could mean the loss of 7,554 acres, or 19.8 percent of the railroad's total land holdings, the loss of 19 million cubic yards of gravel and rock reserves; and the direct loss of $230,000 per year in lease revenue.

Cook Inlet Regional Corporation Selection of Railroad Land

A problem that could affect virtually all railroad lands is the special selection authority of Cook Inlet Region, Incorporated. CIRI considers substantially all railroad land holdings, whether located in Native village selection areas or not, to be eligible for selection. CIRI has formally asked that all railroad lands, except those conveyed to village corporations, be placed into the selection pool that was created by the special statutory authority for CIRI to select lands outside its regional boundaries. To date, CIRI's broad interpretation of the law has not been accepted by the Department of the Interior, which maintains that the CIRI selection pool cannot include railroad lands outside the village selections areas. However, CIRI is expected to challenge the Department of the Interior's view. If CIRI is successful in reversing the Department of the Interior's opinion either administratively or in court, substantially all railroad lands would be subject to CIRI selection. It would then be necessary for the Department of the Interior to make a 3(e) actual-use determination for all railroad lands selected, not just railroad lands located within village selection areas. The narrow standards in the final 3(e) regulations would then be applied to all railroad lands and could result in the loss of virtually all ARR's leased lands, gravel reserves, and other properties along the railbelt.

The Uses of Railroad Lands

The authors feel that the railroad's lands are as essential to its operations as are any of the other ARR assets. They believe that if the ARR is to act as a part of the market economy of the state, it must be capable of exercising some degree of control over the lands with which it is associated. Such control ranges from absolute and perpetual surface control over some of the land to more limited powers over other types of real property.

Lands now under the jurisdiction of the ARR may be categorized as follows:

1. Main line and branch line rights-of-way.
2. Terminals and ports.
3. Lands leased to traffic-producing tenants.
4. Material source lands (for example, gravel deposits).
5. Lands leased to nontraffic-producing tenants.
6. Lands held for future operations and traffic development.
7. Former rights-of-way.
8. Other holdings.

In the authors' opinion, each of these types of land requires specific protection if it is to continue supporting the railroad in its role as a functional participant in the state transport network.

Requiring the most protection are the main line and branch line rights of way. The nature of railroad operations requires that these lands be under complete control of the railroad, including at a minimum the right to:

1. Have complete freedom to add to or delete from the land any structures, roadbeds, adjacent rocks, or gravel or to recontour the land as necessary.
2. Move track within the right-of-way or to add or delete track.
3. Provide loading and unloading facilities for railroad customers or for railroad purposes.
4. Add structures as may be necessary for operation.
5. Remove any vegetation which may be required to operate or expand the railroad's services.
6. Fence the right-of-way.
7. Operate any and all trains necessary.
8. Restrict or grant access to persons or vehicles as it sees fit.
9. Construct and maintain any drainage facilities necessary to preserve the right-of-way.
10. Make any provisions necessary to protect the operational capability of the right-of-way even if this requires access to and control of lands beyond the normal right-of-way limits (e.g., avalanche, flood control).
11. Take such action as may be necessary to safely operate in situations where conflicts with other transport modes may exist.

12. Place all necessary communications and signal devices within the right-of-way or to maintain separate rights-of-way for these items where necessary.

The authors believe that all of these elements must be available to enable the railroad to maintain the property, provide for safe operations, protect the public, meet public regulatory requirements, operate efficiently, and be responsive to economic opportunities and influences. The normal mechanism required to exercise these responsibilities is fee ownership of the property by a railroad. In those relatively unusual circumstances in which a railroad cannot obtain fee ownership, then it occupies a land parcel via a railroad easement. This gives the railroad complete control of all surface rights to the property, including the right to exclude the fee owner from the property and to exercise all of the functions noted above. The usual railroad right-of-way is 100 feet to either side of the center line of the main line. It is very unusual for less than this width of land to be available; however, wider rights-of-way are not uncommon. The Alaska Railroad's enabling legislation specifies a right-of-way width of 200 feet total with a supplement of 50 feet for purposes of operating a communications system where necessary. Terminal or port lands usually have no specific width related to track location. Rather, they are specified in the more traditional types of descriptions used generally in real property.

Lands Providing for Railroad Traffic Development

This category of land is second in importance to that of rights-of-way and terminals. The importance of this category goes beyond the lease income generated by the property to the very essence of railroad traffic and marketing. An analysis of the Alaska Railroad's traffic indicates that only a very small portion of operating revenues are derived from customers whose businesses are not directly adjacent to the railroad's right-of-way.[7] The efficient loading or unloading of carloads requires a customer to have direct access to railroad facilities. This factor is of such importance that it is usually quite difficult to serve a customer who is not directly linked to the railroad. One of the primary tools available to a railroad to solicit this type of traffic is land adjacent to its right-of-way on which a shipper can locate his facilities or store his goods. Thus, the lands available for leasing to traffic-producing customers contribute much to the ability of the railroad to sustain its present operation and to be economically viable. Likewise, those lands which are available for future lease to traffic-producing customers represent the long-term capability of the railroad to continue its existence as an economic enterprise.

In the authors' view, the only mechanism which will permit the railroad to manage these lands effectively is complete control of their use. While there is a clear obligation in ANCSA legislation to honor existing leases whether the landowner is the railroad or another party, the only manner in which a continuing commonality of interest between the railroad and future lease holders can be maintained is by providing ownership of those parcels for the railroad or by requiring any future owner to use them for rail traffic purposes so long as the railroad exists. It is not at all likely that the land development interests of the railroad and a future, non-railroad owner would coincide since land sale or lease for non-railroad purposes would frequently generate much higher income than would typical railroad uses.

Lands, Improvement, and Construction

This category includes those properties from which materials such as gravel and rock are obtained for maintenance and improvement. The authors feel that a railroad must have long-term access to such land as well as a fairly unrestricted right to remove materials as required. These needs are basic to the continuing operation of a railroad, because any railroad's roadbed and track will deteriorate rapidly if not regularly maintained and ballast renewed periodically. This renewal requirement is particularly critical in Alaska where the amount of moisture during spring breakup can, if not controlled, make track unusable within a single year. In addition to regular maintenance, there may be very large short-term demands for rock and gravel to repair damage from floods, avalanches, and earthquakes. The ARR annually requires an estimated 200,000 tons of gravel and 40,000 tons of rock for normal maintenance. In addition to this amount are requirements for emergencies and for track improvements, industry access, and alignment improvements. The latter items result from changing demands of railroad traffic and operation patterns. These are produced by such factors as changes in car types and commodities (such as bulk commodities requiring more substantial track), frequency of operations (more traffic requires more frequent attention regardless of commodity), types of operations (need to improve transit times to attract or keep time-sensitive traffic), or the need to improve operating efficiency (lower maintenance costs or operating costs by realigning track).

Unlike the previous land categories, there is no absolute requirement for ownership of the property if the railroad has the access and extraction rights mentioned previously or has access to commercial gravel. However, without railroad ownership of the materials, the costs of maintenance and improvement will be increased in two ways. One will be the commercial cost of gravel and rock. Having to purchase gravel at the current cost of $13 per ton would cost the ARR a minimum of $2,600,000 annually for normal maintenance. These costs would amount to an additional charge of $1.49 for each revenue ton carried by the Alaska Railroad (in 1980 dollars). In addition to this would be any aggregate demands for emergencies, new construction, or rebuilding. These additional costs would either have to be passed to shippers (and, thus, largely to consumers) by freight rate increases or would have to be supported by a public subsidy. Should increased freight rates be chosen, they will probably make the railroad less competitive and result in higher subsidy demands.

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[7] See "Traffic Base," page 9.

Lands Leased to Nontraffic-Producing Tenants

The lands leased to nontraffic-producing tenants are not necessary to the continued operation of the railroad, except where the lands can be converted to traffic-producing properties either by lease to customers for plant location or by exercise of mineral rights. How much these holdings may assist the railroad in its future operations will largely depend on location in relation to commercial opportunities. Even though the presently leased properties are not essential to the operational survival of the railroad, they do provide a major source of income which permits lower freight rates than might otherwise be the case. Should the railroad lose control of this land, the lost revenue would have to be obtained from other sources—either higher freight rates or public subsidy.

Former Rights-of-Way Land

This final land category is probably important only in terms of the future resource development role that policymakers may wish the railroad to play. Specifically, the railroad currently controls the land of a former right-of-way extending eastward up the Matanuska Valley approximately 30 miles past the Sutton, Eska, and Jonesville coal fields to Chickaloon. This right-of-way provides access to coal resources and will be an essential ingredient in any scheme to export coal from the Matanuska Valley.

According to ARR management, any railroad depends almost entirely upon the way it can use its lands if it is to operate effectively and to market that operation reasonably. Without this ability to utilize lands, any railroad is clearly an unattractive investment. Therefore, without a satisfactory resolution of the current questionable status of Alaska Railroad lands, any potential owner should be hesitant about becoming involved with the railroad. If he should do so without obtaining the types of guarantees specified above, it should be with the clear understanding that this course of action may well lead to a large and continuing drain upon his treasury.

Employee Concerns and Obligations

Present Situation

The Alaska Railroad (ARR) is a federal agency under the Federal Railroad Administration (FRA), U.S. Department of Transportation. Few of the positions held by employees of the Alaska Railroad, the only railroad operated by the federal government, are found in other federal agencies since the majority are unique to railroad operations. The ARR employees, having significant railroad operational experience and knowledge, represent one of the railroad's most valuable assets. In addition, the ARR employees have knowledge of the special railroad operational requirements for Alaska, with its difficult climatic conditions and associated maintenance requirements.

Declining Work Force. After the completion of the pipeline, the Alaska Railroad experienced declining traffic and revenues until the 1981 fiscal year (June 1980). Since that time, significant traffic and revenue increases have occurred despite high interest rates, inflation, and generally poor national economic conditions. In the face of increasing costs and declining revenues and traffic, the Alaska Railroad has annually reduced its work force over the last 5 years. For example, in FY 1976, the railroad employed an average of 1,025 persons, but by April 1981, this workforce totaled only 629 employees, including both permanent and temporary workers.[8]

The following table demonstrates the personnel levels by department in mid-April 1981, according to a railroad manning report (see Table 10).

Organized Labor and the ARR. As regards organized labor for its employees, the Alaska Railroad is similar to private railroads in the continental United States. Unlike private sector railroads, however, most labor agreements with the Alaska Railroad

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[8] Because the Alaska Railroad is a federal agency, there is substantially larger lag between the acknowledgment of declining revenue traffic and a reduction in the number of employees than would be experienced in private railroad operations.

Table 10

Authorized vs. Actual Numbers of ARR Employees

Department	Authorized Position	Total Employees	Permanent Employees	Temporary Employees
Administration	95	82	77	5
Transportation	236	218	202	16
Engineering	270	181	137	44
Mechanical	142	138	130	8
Marketing	14	10	9	1
Total	757	629	555	74

are perpetually in effect until either organized labor or the railroad management wishes to open the labor agreements for renegotiation. This factor has interesting long-range implications in view of the potential transfer of the railroad's ownership and operations.

At the present time, five unions represent the Alaska Railroad employees. These are listed in Table 11 along with the number of employees which each represents.

The Full-Crew Law. An additional area of concern regarding employee operating agreements and a change from federal status involves a current Alaska statute, the full crew law—the only one left in the United States. It requires a five-man train crew, including a locomotive fireman, for all trains. Currently, because it is a federal agency, the ARR is exempt from this law and operates its trains on the basis of agreements negotiated with labor organizations. Usually, these require only three- or four-man crews for each train. If Alaska does not repeal this law during the course of any restructuring, it is unlikely that the railroad would ever be a self-supporting operation. If the present full crew law continues in force, the state should be prepared to pay several million dollars annually in subsidy for unnecessary labor.

Thus, the Alaska Railroad's employee situation is more complex than that of other railroads since its employees are generally not only members of various labor unions (similar to other railroads) but are also federal employees with all of the rights and benefits which are afforded participants in the federal government's civil service system. The implications of these double protection rights and benefits for the proposed transfer are far reaching and significant.

Financial Implications

Another significant consideration in the potential transfer of the Alaska Railroad from the federal government to the State of Alaska is the financial implications of employee protection, including federal retirement benefits.

The current employees of the Alaska Railroad have participated in and contributed to the federal Civil Service Retirement and Disability Fund. The Alaska Railroad has matched the contributions made by each employee during their employment to date, and these contributions have been made out of railroad revenues. The federal Civil Service Retirement System is under the jurisdiction of the U.S. Office of Personnel Management.

The Civil Service Retirement and Disability Fund is the accumulation of money held in trust by the U.S. Treasury for the purpose of paying annuity, refund, and death benefits to persons entitled to them. The present Alaska Railroad employees are among the persons entitled to these benefits.

The identified federal commitments which were made by the Alaska Railroad to employees at the time of employment include the total cost of relocation back to the point of recruitment of any employee and family recruited from outside Alaska when they choose to return. Other employee commitments include participation in the Federal Employees Group Life Insurance Program, health insurance benefits, accrued sick and annual leave, credit for time served as federal employees, turnaround trips to the point of recruitment every two years (as distinguished from relocation), and protection against arbitrary dismissal by the Merit Systems Protection Board.

There are many unanswered questions related to the employees and protection of their rights. These questions can best be answered and the problems

Table 11

Labor Organizations Representing ARR Employees

Organization	Employees Represented
American Train Dispatchers Association	20
Brotherhood of Railway Carmen	37
United Transportation Union	127
American Federation of Government Employees*	315
International Association of Machinists and Aerospace Workers	80
Total	579

*The American Federation of Government Employees represents both white- and blue-collar workers.

solved by the federal government since it is their system and not Alaska's which has given the employees their protection. Failure to solve these obligations prior to the transition phase may well lead to lengthy and costly litigation as well as to excessive employee turnover. Thus, careful consideration of these factors as part of the federal transfer legislation would benefit all concerned.

We should also note that several of the existing labor agreements will continue in force until either the labor organizations or the railroad management wishes to open negotiations. It is probably best that these agreements remain in force for a specified time, after which they would be subject to new negotiations. The transfer legislation could provide for such negotiations and establish the framework for setting labor agreements.

In summary, ARR's legal obligations to its employees are extensive, and the federal government is in a much better position than the state to provide them with a proper transitional program. Such a program would protect the employees, the State of Alaska, and the federal government.

Finances

Its status as a federal agency complicates the financial condition of the Alaska Railroad. For example, none of the traditional measures of financial health such as price-earning, debt-equity, or even revenue-expense ratios properly portray the condition of the operation. In addition, the burden of passenger service (about 35 percent of all trains operated in 1980) distorts even the traditional railroad operating efficiency measures which might otherwise be employed. Financial reporting is done by methods and for reasons which differ from private practice and which are not even entirely consistent with federal government standards. Similarly, public sector capital budgeting and justification is not organized or presented using the methods of the rail industry. The differences result both from conflicting management objectives and requirements for management information which are dictated as much by federal control as by the need to manage operations.

The ARR receives operational funds from four primary sources:

1. Revenues earned by transporting freight and passengers.
2. Income from property leased to others.
3. Reimbursable services performed for others.
4. Congressional appropriations for acquiring capital assets and for major maintenance.

This income is all placed into a single revolving fund account with the U.S. Treasury against which the railroad draws to support its day-to-day operations and fund capital expenditures. Income placed in the account remains available until extended by ARR either for operations, capital expenditures, or on work authorized by appropriation.

While the revenue from the railroad's own operations is largely independent of external control,[9] those resources obtained by Congressional appropriation are subject to many of the same restraints common to the budgets of all federal agencies. These requirements dictate a budgetary process which may have both revenue-based funding and appropriated funding used for similar purposes, while justification for their use may be quite different. The justification for appropriated funding is similar to that seen for other agencies which seek money to maintain the existing property and operations and to comply with federal guidelines. This is somewhat different from the approach used on most private rail systems where budgets are developed and justified on the basis of the profitability of operations and the investments being funded.

With this background, let us look in more detail at the railroad's financial situation. This analysis will deal with the *financial statements, revenues and expenses, assets and liabilities, and capital budgets.* We will review both the information available from this material and its limitations. In addition, where possible, we will explain the future implications of these items.

Reporting Financial Information

The Alaska Railroad prepares three public financial documents. One of these, the *capital budget and appropriation request*, will be dealt with in another part of this section. The other two are the *annual report* and the *monthly financial statements.* While both provide useful information, they are limited in scope when compared to similar documents prepared by private railroads.

Annual Reports. The annual reports are prepared following the end of each federal fiscal year (September 30). They summarize the previous year's financial performances and contain a limited amount of operational data as well as a narrative outline of the previous year's events. The financial information includes a brief income statement, balance sheet, and a statement of changes in financial position. None of these are entirely consistent with private practice in stockholder reports, principally due to the federal status. The differences are most clearly apparent in the balance sheet where liabilities include only a limited number of current items and neither long-term liabilities nor stockholders' equity. The long-term liabilities do not exist since the railroad is debt free and need not provide for taxes. Substituted for stockholder's equity is an item termed "Proprietary Interest of the United States Government," which is the sum of all federal appropriations plus retained earning from operations.

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[9] The only restraint upon expenditures of these revenues is that they must be used for a function authorized the railroad in its enabling legislation, as amended.

The income statement varies from that of private practice in that it does not account for fixed charges other than depreciation. It is important to note that the ARR, as is common with most railroads, does not capitalize and depreciate its track structure. Rather, it uses the practice known as betterment accounting, which charges any replacement material regardless of the amount of expenditure, to current maintenance expenses and capitalizes only the improvements. While the result of this practice for a private railroad is to present the financial status in a more conservative light, the effect on the Alaska Railroad is slightly different. Because the ARR seeks federal appropriations to perform some major track maintenance (which becomes part of the proprietary interest), this work is effectively capitalized (whether it involves replacements or improvements) and is then not depreciated. Effectively, this practice tends to understate the long-term capital requirements to maintain an adequate track structure while at the same time, it overstates current maintenance expenditures.

Table 12 shows the changes in fixed asset values which have taken place in the 1976-1981 period. The increase is due primarily to additions to equipment (mostly fifteen new locomotives) and to structures.

A difficulty on the asset side of the balance sheet involves establishing the value of assets. It should be remembered that a considerable portion of the ARR properties were transferred from other federal agencies, often at a cost of only transport charges or salvage value. The entire line from Whittier to Portage is in this category. To what extent this type of accounting for the assets understates their true value is not certain. For present day-to-day operational purposes, it is not of great importance except that it understates the depreciation charges and thus the capital reserve requirements. Any restructuring will necessitate the identification of appropriate asset values for rate-making and other purposes.

Table 12

End of Fiscal Year Fixed Assets
($ in millions)

	Date					
	9/81	9/80	9/79	9/78	9/77	9/76
Land*	.27	.27	.62	.43	.27	.27
Buildings	12.32	12.36	12.39	12.15	11.96	11.51
Other Structures & Facilities	112.13	111.69	110.69	108.83	107.63	107.20
Equipment	45.84	44.03	41.33	40.93	40.93	36.36
Nonoperating Property	1.88	2.99	3.93	3.54	3.54	3.44
Total Fixed Assets	172.44	171.34	168.96	165.88	164.33	159.28

*Only purchased lands are included in this statement. See Table 9 for values of all lands.

Source: Alaska Railroad Financial Statements.

The lands controlled by the railroad are also not included in assets, except for those directly purchased by the ARR, because most of the land was transferred to the railroad at no cost by executive order or public land order.

Monthly Financial Statements. The monthly financial statements are much more detailed than the annual reports. They provide both an income statement and a balance sheet in the same format as the annual report. However, each line item is further broken down into relevant details. Conceptually, the same limitations apply to these statements as to the annual reports. This investigation, however, discovered an additional serious limitation: the inability to isolate passenger- from freight-service costs. While revenues are separately reported, costs are separated in only a few categories. Those that are recognized appear to be only a few of the short-term, out-of-pocket costs. This clearly does not reflect the full, direct cost of providing the passenger service, which constitutes 30 to 40 percent of all train miles operated. Because of the importance of this function of the ARR, we allocated the costs left unassigned by the financial statements and present them later in this section.

Another important difference between the ARR and normal industry reporting occurs in the area of operational statistics, which allow the analyst to prepare efficiency measurements. While the annual report contains limited data on operations, the financial statements have none. Those in the annual report are not equivalent to those required of private railroads in their annual reports to the ICC or even to many of those prepared for stockholders. This area represents an important deficiency in the ARR's public reports.

With these explanations in mind, it is appropriate to look at the financial performance of the Alaska Railroad during the past several years.

Financial Performance

The Alaska Railroad has experienced rather varied financial circumstances over the past decade. It experienced some of its best years during 1975 and 1976 and some of its worst in 1979 and 1980. The ARR's cyclic performance during these years is representative of the entire financial and operational history of the railroad. It also indicates the sensitivity of the railroad's financial performance to traffic changes which would be considered minor on most railroads.

Table 13 summarizes the income and expense performance between October 1975 and September 1981. As can be seen, revenues had fallen by 1979 to half their 1976 level; expenses stabilized after 1977 and remained so through 1980. This indicates the sensitivity of the profit or loss to changes in revenue rather than to cost factors. This is a basic fact for all light-density railroads; they must operate at certain minimum levels if they are to handle available traffic and maintain certain operable levels. That is what has occurred on the Alaska Railroad. To retain traffic, it has had to maintain and operate the property at a certain level. However, it would cost only marginally more to operate at a considerably higher level, generating much more revenue. The 1981 results further illustrate this problem. As noted below, the composition of costs and revenues provides significant insight into the various cost factors.

Table 13

Revenues and Expenses
($ in millions)

	FY 81	FY 80	FY 79	FY 78	FY 77	FY 76
REVENUE						
Operating	$40.78	$26.74	$23.08	$27.44	$33.38	$46.06
Nonoperating	3.16	2.13	2.08	1.65	1.65	1.15
Total	43.94	28.89	25.16	29.09	35.03	47.21
EXPENSES						
Operating	40.36	34.38	31.28	33.30	35.70	49.67
Nonoperating	.27	.34	.21	.21	.25	.18
Total	40.63	34.72	31.49	33.51	35.95	49.85
Gain (loss)	3.31	(5.83)	(6.33)	(4.42)	(.92)	(2.64)
Depreciation Included in Expenses	3.27	3.53	3.22	3.20	3.12	2.61
Cash Gain (loss)	6.58	(2.30)	(3.11)	(1.22)	2.20	(.03)

Source: Alaska Railroad Financial Statements.

Table 14

1978 Revenues and Expenses
($ in millions)

	Freight	Passenger	Other	Total
Revenue-Total	$ 23.69	$1.50	$ 3.77	$ 28.96
Operating	23.69	1.50	2.12	27.31
Nonoperating			1.65	1.65
Cash Expense	21.99	6.35	1.98	30.32
Engineering	4.24	0.64		4.88
Mechanical	5.29	1.28		6.57
Transportation	9.30	2.95		12.25
Traffic	0.29	0.13		0.42
Communications	0.30	0.14		0.44
Administration	2.57	1.21		3.78
Other Operating			1.86	1.86
Nonoperating			0.12	0.12
Depreciation	2.81	0.26	0.12	3.19
Total Expense	24.80	6.61	2.10	33.51
Gain (Loss) Before Depreciation	1.70	(4.85)	1.79	(1.36)
Fully Allocated Gain (Loss)	(1.11)	(5.11)	1.67	(4.55)

Sources: Alaska Railroad Financial Statements and Annual Report recomputed using ICC cost allocation methods.

Tables 14, 15, and 16 provide a more detailed analysis of 1978, 1979, and 1980 revenues and expenses distributed to freight and passenger service and to other activities. It is important to note that the method used by this analysis develops fully allocated costs.[10] That is, the method allocates both the direct, short-term, out-of-pocket costs and the various types of joint costs and overhead to the appropriate service. This estimates the resources used to supervise the passenger trains' operation and maintenance, to market and administer them, to provide the incremental track maintenance required by them, to service and supply them, and to control their activities. It should be realized that if the passenger trains were eliminated, many of these joint and common costs would remain. However, over the long term, it would be possible to eliminate them or to divert the resources they represent to more productive uses.[11]

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[10] Where the financial statements provided specific cost breakouts (such as passenger or freight car maintenance), these were used directly rather than being allocated.

Table 15

1979 Revenues and Expenses
($ in millions)

	Freight	Passenger	Other	Total
Revenue-Total	$19.08	$1.96	$4.11	$25.15
Operating	19.08	1.96	2.03	23.07
Nonoperating			2.08	2.08
Cash Expense	20.10	6.17	2.00	28.27
Engineering	3.35	0.59		3.94
Mechanical	4.77	1.15		5.92
Transportation	8.86	2.89		11.75
Traffic	0.31	0.16		0.47
Communications	0.25	0.13		0.38
Administration	2.56	1.25		3.81
Other Operating			1.91	1.91
Nonoperating			0.09	0.09
Depreciation	2.82	0.25	0.15	3.22
Total Expense	22.92	6.42	2.15	31.49
Gain (Loss) Before Depreciation	(1.02)	(4.21)	2.11	(3.12)
Fully Allocated Gain (Loss)	(3.84)	(4.46)	1.96	(6.34)

Sources: Alaska Railroad Financial Statements and Annual Report recomputed using ICC cost allocation methods.

The analysis indicates that the nonrail activities have consistently shown a positive net income. The freight service has shown a positive cash flow (net income before deduction of depreciation) in 1978 and 1980, but 1979 indicates a $1.02 million cash loss. For the 3 years, the total cash gain on freight operations was $2.48 million. While this is not sufficient to cover all depreciation charges, it does represent an impressive performance, particularly when considered in relation to the weak Alaska economy during this period. With freight and other activities combined, the cash flow is positive for all 3 years, and total net income is positive (or zero) in 1978 and 1980. This leaves the passenger service as the principal source of the substantial losses shown in the annual reports. Such a result is consistent with the problems experienced by other North American railroads during the past 30 years.

There are two possible causes for the passenger service's poor financial situation: excessive expenses or inadequate revenues. An examination of the various expense categories indicates that they are not excessive considering the substantial proportion of the operations represented by passenger service. Given the nature of passenger train operations, this is in fact a substantial compliment to the ARR management. This result is confirmed by comparing the ARR passenger service to that of the Denver and Rio Grande Western (D&RGW) passenger service for comparable periods. During 1978 to 1980, approximately the same number of passenger train miles were operated by both railroads. Expenses were also comparable; however, the D&RGW revenues were 50 percent to 100 percent greater, resulting in a significantly smaller loss attributed to passenger service. ARR revenues, on the other hand, were not large enough to be comparable to the proportion of total operations represented by passenger service.

A more detailed discussion of the passenger problem is contained in the following section (Competitive and Regulatory Environment). It appears, however, that it would be impossible to generate enough passenger traffic to make the net income from passenger operations positive. This is the basis of a substantial long-term public policy question. It

Table 16

1980 Revenues and Expenses
($ in millions)

	Freight	Passenger	Other	Total
Revenue-Total	$22.72	$2.09	$4.08	$28.89
Operating	22.72	2.09	1.92	26.73
Nonoperating			2.16	2.16
Cash Expense	20.92	7.60	2.67	31.19
Engineering	3.20	0.59		3.79
Mechanical	5.27	1.59		6.86
Transportation	9.34	3.58		12.92
Traffic	0.33	0.20		0.53
Communications	0.25	0.15		0.40
Administration	2.53	1.49		4.02
Other Operating			2.42	2.42
Nonoperating			0.25	0.25
Depreciation	3.08	0.32	0.13	3.53
Total Expense	24.00	7.92	2.80	34.72
Gain (Loss) Before Depreciation	1.80	(5.51)	1.41	(2.30)
Fully Allocated Gain (Loss)	(1.28)	(5.83)	1.28	(5.83)

Sources: Alaska Railroad Financial Statements and Annual Report recomputed using ICC cost allocation methods.

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[11] Where ARR accounting records did not specifically allocate costs to either freight or passenger service, they were so allocated using methods prescribed by the Interstate Commerce Commission to the extent that the required operating statistics were available. See Code of Federal Regulations, Title 49, Part 1242.

is also important to realize that, except for a modest depreciation charge against passenger service, this analysis has not included any capital costs.

Since it appears that freight service is a fairly stable income source even in economically depressed years, it is useful to examine the effects of adding a major additional long-term movement. For purposes of this discussion, it is assumed that the recently announced pending coal movement from Healy to Seward for export saw its initial operation in 1980. The revised income statement is shown in Table 17 based on the proposed 800,000 metric tons moving at a rate of $10.10 per ton. Operation expenses are based on data supplied by ARR, and depreciation costs are computed at current rates based on the assumption that all new equipment is used for the movement. For this analysis, only freight and other activities are considered. The changes in performance due to this single movement are considerable. An overall net income of $0 becomes a positive $1.82 million, and total cash generated goes from $3.21 million to $5.37 million. This clearly indicates both the dependence of a light-density railroad on single movements and, more importantly, the positive effects of a substantial traffic source with long-term prospects.

Table 17

1980 Financial Performance with Potential Coal Traffic

800,000 Metric Tons = 881,600 Short Tons
($ in millions)

	Freight	Other	Total
Without Coal			
Revenue	$ 22.72	$ 4.08	$ 26.80
Operating	22.72	1.92	24.64
Nonoperating		2.16	2.16
Cash Expense	20.92	2.67	23.59
Operating	20.92	2.42	23.34
Nonoperating		0.25	0.25
Depreciation	3.08	0.13	3.21
Total Expense	24.00	2.80	26.80
Gain (Loss) Before Depreciation	1.80	1.41	3.21
Fully Allocated Gain (Loss)	(1.28)	1.28	0.00
With Coal			
Revenue	31.62	4.08	35.70
Operating	31.62	1.92	33.54
Nonoperating		2.16	2.16
Cash Expense	27.66	2.67	30.33
Operating	27.66	2.42	30.08
Nonoperating		0.25	0.25
Depreciation	3.42	0.13	3.21
Total Expense	31.08	2.80	33.88
Gain (Loss) Before Depreciation	3.96	1.41	5.37
Fully Allocated Gain (Loss)	0.54	1.28	1.82

Source: Table 16 and Alaska Railroad records.

Thus, the overall indication is of a property that has undergone substantial financial changes over the past 5 years. Although it has seen serious diminution in the volume and ton-miles of available freight traffic, there has been sufficient control of costs to maintain an overall positive cash flow each year after the passenger service is deducted from the results. A high-revenue, moderate-cost movement such as that proposed for coal could add stability to the performance.

Capital Budgets

Unlike private railroads, the Alaska Railroad does not have access to capital markets. It cannot borrow funds for equipment and cannot mortgage its property to generate capital. These factors mean that the only methods of obtaining funds for capital improvements are through internal generation (either depreciation charges or financial surplus) or federal appropriation. It also means that it must have sufficient capital to pay cash for improvements.[12]

Table 18 lists the capital and major maintenance expenses between July 1975 and September 1980 along with the source of funds. Clearly, about 75 percent of the funding came from appropriations rather than from earnings. As noted in the previous section, it appears that the principal reason for this is the negative impact of passenger service on income. It also indicates that without passenger service, the ARR would have produced $7.79 million internal capital between 1978 and 1980 instead of the $1.2 million actually available. This would have reduced the necessary appropriation from $17.3 million to $9.51 million, even assuming that no money had been retained from earlier, more prosperous years. Clearly, the recognition of passenger service as a public good requiring public support could have a major impact upon the railroad's capital budget flexibility.

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[12] The usual method used by private railroads to purchase rail equipment is through the "Philadelphia Plan," in which the down payment is 20 percent of purchase price, with the balance paid over 15 years. Because rail equipment offers excellent security, the interest rates are usually substantially below the prime rate.

Table 18

Capital and Major Maintenance Programs
($ in millions)

Use	1980	1979	1978	1977	1976[a]	Total
Buildings	$0.2	$0.1	$0.1	$0.1	$0.5	$1.0
Roadbed, Track, Structures	3.3	2.2	2.8	3.9	4.2	16.4
Equipment	1.8	0.7	0.3	4.5	12.6	19.9
Other Projects	0.2	6.4[b]	0.4	0.3	0.5	7.8
Total	5.5	9.4	3.6	8.8	17.8	45.1
Fund Source:						
Appropriations	5.0	9.3	3.0	6.0	9.0	32.3
Railroad Earnings	0.5	0.1	0.6	2.8	8.8	12.5

[a] 1976 was a 15-month fiscal year.

[b] $6.3 million for repairs to Seward and Whittier docks.

Source: Alaska Railroad 1980 Annual Report.

It is in capital budgeting that the Alaska Railroad differs the most financially from private operations. This difference results from, and is evident in, several features of the budget, including the distribution among expenditure types, the budget process and line item justifications, and the types of programs included in the budget. As noted earlier, many of the budgeting objectives, fund sources, and utilization capabilities differ. These variations are reflected in the documents themselves.

The budget tends to be heavily weighted toward improving facilities and light equipment rather than purchasing rolling stock. In private industry, the reverse tends to be true. There are three reasons for the difference. One is the ease with which private industry can finance equipment. This ease permits a relatively modest cash flow to leverage substantial amounts of equipment purchases, particularly when used in conjunction with reasonable interest rates and tax advantages related to interest, investment tax credits, and accelerated depreciation. Obviously, the ARR cannot take advantage of any of these. A second reason that equipment expenditures receive less emphasis, particularly in marginal years, is that individual items are so expensive. A locomotive costs $750,000 to $900,000, while cars run $40,000 to $50,000 each. Thus, if an ARR budget is cut by FRA, OMB, or the Congress, an event which occurs regularly, it is easier to reduce the size of track programs than equipment purchases, since the former tends to comprise a large number of smaller items and personnel requirements. With track or structure programs, at least some of the improvement can usually be made, but an equipment acquisition program must often be written off entirely even if a portion of the funding is not approved. A third reason for these budget priorities is that it is easier to repair older equipment and to keep it operating than it is to operate over track which has not been properly maintained. Ultimately, the differences in budget priorities provide for physical facilities maintenance in the manner of most federal agencies, but they do not necessarily respond to marketplace influences.

The next difference between ARR's budget and those of private capital arises in the budget development process and the basis for project selection and justification. On private railroads, the projects for a capital improvement plan are developed on the basis of either rate of return or net present value of the proposal. The ability to contribute to the profitability (usually long term) of the organization is the primary criteria of selection. On the Alaska Railroad, this does not appear to be strictly the case. ARR budgeting documents must conform to U.S. Department of Transportation requirements. These requirements rarely reflect a need to operate profitably. Thus, the justification for projects in the ARR budget is almost inevitably based on cost minimization criteria or satisfaction of federal requirements. While cost minimization is an important part of developing an efficient operation, it may or may not reflect the most profitable use of resources. Such an approach also fails to consider the opportunity costs of alternative uses of capital. Between the 1978 and 1982 budget requests, that of 1979 was the only one which contained a cost-benefit analysis and a computation of internal rate-of-return for individual projects. In no case was there an attempt to estimate overall returns for groups of projects. These overall numbers may be considerably different from the sum of individual returns due to various project interdependencies and timings. It should be emphasized that the majority of these problems result from the requirement that the ARR follow federal budgeting procedures rather than allowing its management to develop programs, as much as possible, on the same basis as private firms.

The final difference between ARR and private budgeting practices is the type of projects incorporated into the capital budget. The ARR's budget includes both strict capital items and major maintenance, which would be part of ordinary expenses under ICC accounting rules and within most private organizations. This causes the income requirements to be understated. This problem is exacerbated by the use of betterment accounting for track structure as explained earlier. The proportion of the budget which is actually devoted to maintenance rather than to capital expenditures is difficult to estimate from available data. However, the FY 1982 budget, at the minimum level, lists such items as cross-tie replacement, track surfacing, vegetation control, equipment repair and refurbishing, and building repair, none of which appear to be normal capital items. Once again, the requirement to conform with federal budgeting (this time coupled with railroad betterment accounting) distorts the financial picture of the railroad.

The final capital budgeting item which requires review is the question of deferred maintenance. ARR defines deferred maintenance as:

> ". . . the accumulated maintenance that would have to be performed in order to bring the physical plant up to the material condition and capacity considered necessary to accommodate the level of freight and passenger traffic expected."

In 1977, the ARR estimated deferred maintenance at $58.9 million, with this increasing to $63 million by 1980. Of the 1977 total, $38.7 million was considered to be delayed capital expenditures.[13] Table 19 shows the breakdown of the 1977 total by functional area. It is important to realize that these areas do not represent items which make it unsafe or difficult to operate the railroad. These are items which should be programmed projects but have had implementation delayed. It is not unusual practice in the rail industry to adopt this strategy when revenues are not at an adequate level. Since much of the programming is on a cyclical basis and the items are long-term assets, the practice becomes critical only when it is continued over an extended period. It is also possible to "trade" capital expenditures in exchange for higher current maintenance expenditures. Both are part of the situation at the ARR. This is particularly true for the roadbed and track category where many of the charges are for subgrade which should be upgraded to eliminate future maintenance demand. However, the principal result of not performing the work will be higher current costs, not unsafe conditions or major operational problems. This is the nature of many of ARR's problems, particularly the delayed capital expenditures, although a good deal of the tie renewal appears to be true deferred maintenance.

Thus, it appears that while deferred maintenance may become a long-term difficulty if there is a very large traffic increase (more than the currently projected coal traffic), it does not seem to be a major current problem. The solution of the problem remains difficult to project until the type of financial structure under which this railroad will be operating can be determined. If structured correctly, the projected organization may provide considerable potential to address the problem, certainly more than the present federal structure.

Table 19

Deferred Maintenance by Functional Area

($ in millions)

Rail Relay	$ 7.8
Tie Renewal	7.5
Other Roadbed and Track	15.7
Tunnels	1.7
Bridges	4.3
Buildings	4.9
Other Fixed Facilities	15.7
Communications	0.9
Equipment	0.4
Total	58.9

Source: Alaska Railroad FY 1982 Budget Submittal Documentation.

Competitive and Regulatory Environment

The Alaska Railroad both competes and cooperates with Alaska motor carriers and, through its barge connections, with marine carriers operating between Alaska and the United States. Because the local freight carried by ARR is unsuitable for road haulage due to its bulk, the railroad is relatively free from local competition. The exceptions to this are some petroleum products movement and the local TOFC/COFC service between Anchorage and Fairbanks, which amounts to less than 10 percent of the total traffic between these two points.

However, there are numerous examples of local tariffs which represent cooperative arrangements. In fact, the Anchorage-Fairbanks TOFC/COFC represents one such tariff, while others include grain between Delta and rail points, pipe from Seward or Anchorage to Prudhoe Bay, cement from Anchorage to interior points, and petroleum products between a variety of places. Table 20 lists several Alaska Railroad tariffs which include through rates involving both the Alaska Railroad and motor carriers. Motor carriers also provide drayage services in Anchorage

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[13] Once again, the effect of betterment accounting for track is to increase the apparent level of deferred maintenance. Actually, many track-related deferred-maintenance items are delayed capital expenditures.

Table 20

Alaska Railroad Tariffs Involving Joint Rail-Motor Rates

Tariff	Between	Contents
3065-C	Prince Rupert, B.C., and Ak.	Water/rail/motor rates
3095-A	Washington & British Columbia and Alaska	Water/rail/motor rates
3101-K	British Columbia, Idaho, Montana, Oregon, Washington, Wyoming, and Alaska	Rail/water/rail/motor rates
3016-J	Alaska Points	Rail/motor and motor/rail rates

Source: Alaska Railroad Tariffs 3065-C, 3095-A, 3101-K, 3016-J.

and Fairbanks for the railroad. Table 21 provides a partial list of motor carriers involved in joint arrangements.

It is the interline traffic which brings the railroad into the most direct competition with private carriers. However, even here, ARR is functioning in cooperation with other private firms. The nature of the commodities moved makes the interline traffic more competitive than the local.[14] The marine competitors in this service are Sea-Land Service and Totem Ocean Trailer Express, who operate container ships and roll-on-roll-off trailer ships, respectively, between Puget Sound ports and Anchorage. Both also have through tariff arrangements with motor carriers, as well as with the railroad.

The importance of this traffic is in the volumes available and its high value. The total container, trailer, and railcar traffic through Anchorage and Whittier is presently about 1,350,000 tons annually. Of this, the railroad hauls about 250,000 tons. Some of this is not subject to alternate routings (like heavy machinery, many chemicals, heavy structural shapes); however, most could move by any carrier.

The shipper's choice of carrier is usually based on a combination of price and service characteristics depending on value of cargo and delivery requirements. The most recent innovation used to influence market share was the introduction of contract rates by the railroad. These require the shipper to provide a certain minimum number of carloads in exchange for certain long-term rate maximums and service guarantees. This type of rate was authorized by federal legislation in 1976 and has begun to gain fairly wide acceptance nationally only in the last 2 years. It has created considerable controversy in Alaska, principally because of its success. It has also been the subject of court action and a congressionally mandated ICC investigation to determine whether the prices in the railroad's contracts are in conformance with statutory requirements. Preliminary results indicate that the rates exceed the minimum levels allowed by law and are well below maximum allowable levels.[15]

It is the Interstate Commerce Commission which is responsible for regulation of the economic relations of the various Alaska motor, rail, and water carriers. Executive Order 11107 of April 25, 1963, placed the Alaska Railroad partially under the jurisdiction of the ICC for rate-setting purposes. There were two exceptions which have created difficulties in the railroad's relationship with its competitors, both in terms of marketing and in rate making. These two sections provided that:

> 1. "The Secretary . . . shall allocate . . . a proper portion of the capital investment of the railroad . . . to the national public purposes for which it had originally been built." (This part of the railroad's valuation was to be excluded from the costs on which rates were based.)
> 2. " . . . Rates and charges shall not be deemed to be unjust or unreasonable by reason of failure to yield sufficient revenues to cover any amounts for taxes not actually required by law to be paid or provide a return on capital investment."

Effectively these two provisions allowed the railroad to retain most of its rate-making freedom. This situation remained basically unchanged until 1980 when passage of the Staggers Rail Act (and the subsequent appropriation bill) mandated an investi-

Table 21

Motor Carriers Involved in Through Tariffs with the Alaska Railroad

Alaska West Express, Inc.
Big State Motor Freight, Inc.
Drilling Mud Haulers
Four Star Terminals, Inc.
Frontier Transportation Company
K & W Trucking Company, Inc.
Kodiak Oilfield Haulers, Inc.
Mukluk Freight Line, Inc.
Sourdough Express, Inc.
Weaver Brothers, Inc.

Source: Alaska Railroad Tariffs 3095-A and 3016-J.

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[14] See "Traffic Base," pages 9-11 for a description of the competitive commodity types.

[15] It should also be noted that the ICC investigation has, for the first time, included a cost of capital for the federal investment in the railroad as a part of the basis for determining the legality of rates.

gation of the Alaska Railroad's rail-water rates (the competitive interline movements) to determine whether they were in conformance with the provisions of the act. This represented a substantial change in policy, since the Staggers Act contains very specific provisions regarding the allowable cost basis for rates. The statutory language of the Act makes it clear that the railroad is expected to meet these cost-based tariff requirements, which now form much of the basis for the interline rate making.[16]

Provisions of the Staggers Rail Act provide the basis for marketing and management of rail service delivery. They provide for a good deal of latitude in implementation; however, they do require that economic efficiency be a basic consideration in developing any service and pricing package. They also place a number of restrictions on the relationships between carriers.

Establishing a clear set of pricing rules for the Alaska Railroad is probably the most important function of the new regulatory legislation and the subsequent ICC investigation. These rules define an area of marketing flexibility not previously available. These statutory bounds for pricing also allow the railroad to compete more freely, and they protect its competitors from predatory pricing. However, it is important that they be applied as outlined in the statute if they are to be effectively implemented. Artificial restrictions on the ARR do not appear to be in the best interests of either the state, the ARR's competitors, or the railroad. If Alaska is to develop a financially viable transport system, all participants must become active competitors rather than relying on artificial constraints.

The regulatory environment of the Staggers Act provides a setting for both the competitive and cooperative arrangements between the Alaska Railroad and other carriers. The whole regulatory structure is still in the implementation stage, and the precise application procedure for the new system is not yet known with any degree of certainty. However, it is certain that the new regulations, if imaginatively applied by management, will provide the railroad with considerable opportunity to improve its profitability while simultaneously forcing improvement in the quality of management data and its use. They provide a basic framework for establishing the Alaska Railroad as an integral competitive segment of the state's transport system.

Passenger Service

The Alaska Railroad provides regular scheduled passenger service and special passenger trains. There are two distinct parts of the scheduled passenger service: the long-distance service between Anchorage and Fairbanks and the specialized shuttle service between Portage and Whittier.

The Anchorage-Fairbanks service includes express trains daily in each direction with stops only at Talkeetna and Denali Park during the summer tourist months (May-September). In addition, there are three local mixed trains (passenger and freight cars) per week during the summer. The local trains stop as necessary for passengers along the route and permit hunters, fishermen, and hikers to reach parts of Alaska inaccessible by road. The mixed trains are limited by union agreements to a maximum of twenty-five freight cars per train unless granted a special exemption. The express trains operate with coaches, a dining car, a lounge car, a dome car, and a baggage car for checked luggage. In the winter, there is mixed train passenger service once per week. Mixed trains in both summer and winter have coaches and a diner for passenger service. The summer trains represent one of the most salable tourist attractions in Southcentral and Interior Alaska.

Additional passenger service is offered by the Alaska Railroad in the form of a shuttle train between Portage and Whittier, a distance of 12.4 miles. The train moves autos, trucks, buses, (with passengers allowed to remain in their vehicles) on special quick-loading flat cars and also carries passengers in coaches for the 35-minute trip, which includes three-and-one-half miles of tunnels.

This shuttle train provides access to the state ferry service between Whittier and Valdez and access for the private and commercial boat owners who moor their craft at Whittier. The railroad is the only means of overland transportation to and from Whittier. The equipment originates out of Anchorage and returns to Anchorage each night. The shuttle train from Portage to Whittier provides a summer schedule of three round trips three days per week, four round trips two days per week, and two round trips on the remaining two days of the week. In the winter, the shuttle makes two round trips between Portage and Whittier on Sunday, Wednesday, and Friday, returning to Anchorage each night.

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[16] The Staggers Rail Act of 1980 was enacted following a long period of dissatisfaction with results of ICC regulatory activity and its effect on the financial viability of the rail industry. It had been preceded 3 months earlier by the Motor Carrier Act of 1980 which withdrew most of the economic regulations applicable to the trucking industry. The goals of the rail act were:

1. "To assist the railroads of the nation in rehabilitating the rail system in order to meet the demands of interstate commerce and the national defense.
2. To reform federal regulatory policy so as to preserve a safe, adequate, economical, efficient, and financially stable rail system.
3. To assist the rail system to remain viable in the private section of the economy.
4. To provide a regulatory process that balances the needs of carriers, shippers, and the public.
6. To assist in the rehabilitation and financing of the rail system."

Table 22 indicates the total numbers of passengers carried by the Alaska Railroad during the ten fiscal years from 1971 to 1980. Passenger traffic has been increasing annually since 1975. There were about 154,000 passengers carried in 1953, making it the highest year in passenger service on the railroad. The passengers carried in 1979 reached the second highest level (151,045) followed in 1980 by almost as many (150,678).

Table 22

Alaska Railroad Passengers Carried
FY 1971-1980

Fiscal Year	Passengers
1971	94,000
1972	102,000
1973	74,000
1974	84,000
1975	81,000
1976	84,500
1977	103,632
1978	126,277
1979	151,045
1980	150,678

Source: Alaska Railroad records.

Table 23

Alaska Railroad Passenger Service
FY 1979–1980

Service	FY 1980	FY 1979	Percent Change
Anchorage-Denali Park-Fairbanks	54,165	61,207	−11.5%
Anchorage-Portage-Whittier (Shuttle)	87,357	84,730	+ 3.1
Specials	9,156	5,108	+79.2
Total	150,678	151,045	− 0.2%

Source: Alaska Railroad Annual Reports.

Table 23 shows the passenger service in the last 2 years. While the Anchorage-Fairbanks run suffered a traffic loss, there was a substantial gain on both the Portage-Whittier shuttle and special trains. The railroad operates excursion train services for special events such as the Alaska State Fair in Palmer and scenic trips to Seward.

It is important for the State of Alaska and the railroad to focus on the purpose and function of the passenger service. The State has already provided financial subsidy to assist in meeting some of its operational deficit and in providing improved shuttle service. The passenger equipment now in service is old and will soon have to be substantially rehabilitated to compete in the marketplace. The passenger cars are, in general, well-maintained, but are now in need of modernization, including installation of all-electric heating and air conditioning. The interiors have not been refurbished except for upholstery. According to a memorandum by AMTRAK evaluating the Alaska Railroad passenger service, dated November 21, 1979, the estimated cost to rehabilitate passenger equipment would be about $6 million. The railroad, in the next few years, can keep sufficient equipment in service, particularly with the recent acquisition of eight long-distance coaches from the Southern Railway. In the long term, however, the form, style, and mechanical aspects of passenger train service in Alaska must be re-evaluated.

It should be clear from previous portions of this report that if the State of Alaska is to have passenger train service on the Alaska Railroad, it will require a substantial public operational and capital subsidy. The freight and other revenues of the railroad have, in the past, been used as a subsidy supplement to the passenger revenue. This is known as "cross-subsidy"—taking freight income to pay for passenger operating expenses. However, the authors feel that such cross subsidization is not in the best interest of the ARR, if the railroad is to function efficiently as a business enterprise within the state's total transportation system.

In the "Finances" section of this report, we attempted to ascertain more accurately the revenue and expenses of freight and passenger service (page 20). Our analysis indicated that the cost of passenger service is reasonable when comparing the number of passenger trains operated to the total number of trains. Therefore, the operational costs for passenger service appear to be appropriate. The problem is that there are simply an insufficient number of passengers to pay operational costs. Raising fares to provide revenue equal to such operational costs would reduce the number of passengers served, leading to a continuation of the deficit.

Revenue and expenses have been allocated between passenger and other categories. The results of these allocations may be found in Table 24. In each of the past 3 years, passenger service has shown a substantial loss while freight and other railroad services have shown a gain. This is true even in the light of unfavorable economic conditions and low traffic volumes during these years. The financial losses in passenger service have been sufficient to cause the Alaska Railroad to have an overall loss. Thus, cross-subsidization of passenger service by freight service clearly is detrimental to the railroad. The subsidy required for each passenger carried was as follows: 1978—$38.41; 1979—$27.87, 1980—$36.57.

It should also be noted that in this analysis the passenger service received credit for revenue from the vehicles as well as the passengers hauled on the Portage-Whittier shuttle service and for mail and baggage revenues.

Table 24

Alaska Railroad Revenue and Expenses
FY 1978–1980
($ in millions)

	FY 1978	FY 1979	FY 1980
Passengers			
Revenue	$1.50	$1.96	$2.09
Cash Expenses	6.35	6.17	7.60
Gain (Loss)	(4.85)	(4.21)	(5.51)
Freight and Other			
Revenue	27.46	23.19	26.80
Cash Expenses	23.97	22.10	23.59
Gain (Loss)	3.49	1.09	3.21

Note: Depreciation is not included but may be found elsewhere in the report.

Sources: Alaska Railroad reports; Interstate Commerce Commission Investigation; computed by Institute of Social and Economic Research, University of Alaska, and Bivens and Associates, Inc.

Passenger service is important to Alaska, it is a service that can and should be provided by the ARR. However, the interests of the railroad and the state would best be served if passenger and freight service were separated both operationally and by cost accounting. In that way, passenger service would still be provided as required and requested, but with the understanding that the service requires public subsidy.

RESTRUCTURING ALTERNATIVES

Congress may soon pass legislation for the transfer of the Alaska Railroad from the Federal Railroad Administration, U.S. Department of Transportation, to the State of Alaska. Before such a transfer can take place, the State of Alaska must determine the organizational structure it will use to own and operate the railroad. This organizational structure will most probably become the basis for state legislation.

A potential approach to the state's ownership and operation of the ARR in the period of transition is discussed on pages 34 and 35 of this report ("Alaska Railroad Transition"). The purpose of this section is to describe various organizational alternatives for the state to consider before it selects the most appropriate organization for the Alaska Railroad.

Existing Organizational Limitations

In selecting an appropriate organization for a state-owned and/or state-operated Alaska Railroad, policymakers must understand the limitations of the existing organizational structure in order to avoid perpetuating them. These limitations are briefly described below:

- **Inability to Obtain Adequate Capital Investment Funds.** Although the Alaska Railroad, like any rail property, is capital intensive, the ARR has no continuing means for obtaining adequate funds for essential capital investments. All capital funds for the Alaska Railroad have been obtained out of the revenue generated by the railroad or from Congressional appropriations. The railroad is debt free, which is advantageous. However, the funds available from the two current capital sources, revenue and appropriations, have been insufficient to modernize much of the car fleet and other equipment including passenger cars. The process for obtaining the needed capital appropriations is difficult and usually political, providing the railroad with little assurance that the required funds will be available when necessary. The funding mechanisms presently available also make it impossible for the ARR to realistically plan and budget more than a year in advance. There is a need for the Alaska Railroad to be able to borrow capital investment funds and/or to raise such funds from a variety of public and private sources.

- **Marketing is Difficult Because of Competitive Issues.** As a federal agency, the Alaska Railroad faces difficult marketing conditions. If the railroad markets aggressively, other transportation firms allege that the reason for the railroad's traffic success is public financial support. On the other hand, the lack of adequate marketing may result in the need for public subsidy. The Interstate Commerce Commission (ICC) was mandated by the Staggers Rail Act of 1980 to investigate such allegations. The ICC study has been completed and found that the questioned rates charged by the Alaska Railroad are compensatory and do not constitute predatory pricing, as was alleged by some of its marine and highway competitors. The Alaska Railroad needs the freedom to agressively market its transportation services.

- **Management Does Not Have Required Flexibility.** Alaska's economic activity is dynamic, which means that rail service needs also change frequently. Under its federal agency status, the Alaska Railroad management does not have the flexibility required to be responsive to changing rail service needs. Even though the railroad has enjoyed a certain autonomy through the years, there are endless federal regulations which must be followed in the transactions of daily business. The ARR management needs flexibility in operating the railroad if they are to make it a self-sufficient component of Alaska's economy and if the ARR is to contribute its full capability to Alaska's overall development.

- **Employees are Unsure of Their Status.** Most of the employees of the Alaska Railroad belong to unions in addition to being federal agency personnel. Therefore, the employees are uncertain whether they work for a railroad or for a federal agency. In effect, the railroad personnel have two sets of rules by which personnel matters are settled, and often these regulations conflict, causing confusion and sometimes hampering performance. They certainly make administration of the property difficult.

- **Needs for Rail Services Have Changed.** The Enabling Act for the Alaska Railroad established as primary purposes for the railroad the connection of Interior Alaska with open Pacific Ocean harbors and the stimulation of development. These purposes have either been fulfilled or are no longer applicable. There has not been a recent policy evaluation or a determination for various aspects of rail service in Alaska based on the changes which have occurred. These include such changes as:

  1. Statehood.
  2. Energy development in Alaska.
  3. Changes in Alaska ports and port development.
  4. Marine transportation interface changes.
  5. Railroad deregulation and availability of contract rates.
  6. Less reliance on rail transport for defense installations.
  7. Improvements in nonrailroad transportation in Alaska.

  Due to these circumstances, the state must clearly determine the role that the Alaska Railroad should now play as part of the Alaska transportation system.

- **Alaska Railroad is Burdened with Federal Agency Requirements.** The Alaska Railroad, in addition to the requirements placed on other common carriers by federal regulations, must also meet various federal agency requirements. Because it is a federal agency, numerous reports are required of the railroad that do not conform to railroad practices or procedures. The railroad must, therefore, spend time trying to force its operation into a format which was designed for other federal agencies. This results in nonproductive time and increased documentation either in preparing reports of no significant management value, explaining why the Alaska Railroad cannot comply with federal requirements, or explaining what was reported in an attempt to comply with external demands.

- **Procurement is Cumbersome and Slow.** The Alaska Railroad must follow federal procurement regulations. Since the Alaska Railroad is the only railroad owned and operated by the federal government, the equipment, materials, and supplies for the railroad are not common federal agency purchases. There are unnecessary delays in obtaining essential supplies and equipment which often limit the railroad's ability to either anticipate or react to market opportunities. The procurement process is also a public process which tends to preclude negotiated purchases and requires direct cash outlays, thereby increasing the costs.

- **Passenger Service is Subsidized by Freight.** Railroad passenger service is more of a social service than a business. Fares (which could be higher than they currently are) cannot be raised sufficiently to cover the true cost of the service. However, rail passenger service is publicly subsidized throughout the United States and the rest of the world. Since the rail freight service is used to subsidize passenger service in Alaska, the public has had to provide the Alaska Railroad with tax revenues for its operation, maintenance, and rehabilitation from time to time. The accounting system on the Alaska Railroad does not adequately separate the freight and passenger costs for railroad expenses. There is a need to separate the freight and passenger costs and to allocate the passenger cost to the public as a social service.

- **Alaska Railroad Cannot Negotiate Solutions to its Problems.** As a federal agency, the Alaska Railroad has a high degree of public visibility. This tends to preclude the ARR's negotiating solutions to its problems or taking advantage of business opportunities. In the past, the railroad has been able to make certain business decisions without the necessity of Washington approval. Recently, however, there appears to be a shift toward centralization of decision making which prevents negotiations for business within Alaska.

Railroad Perspective: Public Service or Business?

The history of the Alaska Railroad bears out this split perspective of the railroad; is it public service or business? Viewed historically from a public service perspective, the Alaska Railroad has been a success. It has generally accomplished its public service mission by connecting Interior Alaska with open Pacific Ocean ports. The railroad has assisted in developing the urban communities in what has been called the "Railbelt" of Alaska. The ARR serves Alaska's coal fields; it has opened up the Matanuska Valley agricultural areas; it has fostered settlement of public lands. In addition, the ARR has moved large volumes of commodities to and from Alaskan communities and between them at a reasonable cost. Products have been made available at affordable transportation costs. The movement of military personnel and material by rail has aided the national defense structure. The railroad has also provided passenger trains as a public service function.

However, the view of the Alaska Railroad from the business perspective has been less clear and more intermittent. The business perspective involves railroad economics—meeting fully allocated costs plus a return on the investment. The Alaska Railroad has generally not been a profitable business enterprise, except for a few years of substantial traffic resulting from the war or pipeline construction.

This dichotomy between public service and business railroad operation has been reflected in the management and personnel of the Alaska Railroad. Marketing of the railroad's services, as previously mentioned, has also reflected this conflict of perspective The management decisions which have been made on the railroad have, on occasion, reflected both the public service and the business perspectives.

Faced with the prospect of state ownership and (or) operation of the Alaska Railroad, the decision-makers in the State of Alaska must decide whether the property is to be governed from a public service or a business orientation. The long-range implications of this decision for the people of Alaska are significant. Much debate, discussion, and careful consideration will be required to determine this policy, and the state must also consciously decide where to draw the line between the public service and business sectors of the enterprise.

One major implication of the state's railroad perspective is in the selection of the organizational alternative for the Alaska Railroad. The organizational structure chosen by the state will not assure that the railroad will be operated from the perspective selected, but the appropriate organization can help to facilitate its operation within the framework established by the State of Alaska.

Finally, the transfer of the ARR to the state will provide Alaska with an opportunity to benefit from the railroad's past experience under federal government operation and resolve the uncertainty and conflicts of running the railroad as a public service versus a business operation.

Assumptions and Criteria for a State Railroad Organization

The following assumptions concerning the railroad and its relationship to the state were used to develop the criteria and proposals for an organization to operate a state-owned railroad:

1. The Alaska Railroad is to be transferred to the State of Alaska without direct compensation of the federal government, but with indirect costs to the state for existing liabilities and any requirements for capital investments.
2. The State of Alaska wishes to operate the railroad in the most efficient manner, minimizing the cost to the taxpayers of the state.
3. The Alaska Railroad is an important element of the state's transportation system, and any state investments relating to transportation will be made with full recognition of the importance and intermodal nature of the railroad.
4. The Alaska Railroad can and will be responsive to changing needs and opportunities for transportation services.
5. The railroad revenues are to be used to provide essential rail service, maintain and

improve railroad property, and meet operational expenses.

6. The public's capital investments are to be protected.
7. The rail service rates are to remain competitive.
8. Public railroad operational subsidies are to be minimized.
9. Rail users are to receive good service, including adequate service frequency, an adequate number of cars, and appropriate car types.
10. The Alaska Railroad is to cooperate with the state, local governments, ports, businesses, industries, and other transportation modes within established policies and legal constraints.

Establishing criteria designed to meet the rail service needs of Alaska will enable the state administration and legislature to evaluate the organizational alternatives subsequently described. Each organizational structure can be measured by the extent to which it satisfies the following criteria:

1. Ability to obtain access to public and private capital funds.
2. Freedom of management to make the railroad's operational decisions within established policies.
3. Clear-cut lines of management responsibility and accountability for decisions.
4. Marketing freedom within established policies and budgetary constraints.
5. Clear decision-making authority without a cumbersome and bureaucratic process.
6. Separation of freight and passenger service functions and accounting.
7. Ability to efficiently procure necessary supplies, equipment, services, and materials within appropriate policies and budgetary authority.
8. Management capability to make long-term commitments within established policies.
9. Management freedom to negotiate solutions to problems and to take advantage of service opportunities.
10. Industrial development capability on Alaska Railroad land.
11. Performance-based personnel management, including the direct ability to hire, fire, promote, train, supervise, and direct required railroad employees.
12. Ability to provide financial and other incentives for performance.

We recognize that it may not be possible or acceptable to have a state organization which fully meets all of these criteria. However, these criteria are important in defining the long-term objectives for the Alaska Railroad. The State of Alaska should seek an acceptable organizational structure which will enable the railroad to operate as effectively as possible within these areas.

Organizational Alternatives Considered

When we began this study, various alternatives were considered possible. Among these were:

- Keeping the status quo—letting the ARR continue to operate as a federal agency.
- Allowing the ARR to operate as a federal agency corporation like the Consolidated Railroad Corporation (Conrail) or Amtrak.
- Selling the ARR to private investors.

However, during the early stages of this study the federal government made clear its intentions to divest itself not only of the ARR, but also of Conrail and Amtrak, which precluded the first two alternatives. Further, the difficulty a private investor would have in financing the marginally profitable ARR, in addition to the complex issue of unresolved land-transfer problems, effectively precluded the third alternative. Thus, there emerged but three remaining alternatives that seemed to offer workable opportunities for the ARR. These included the state (1) operating the ARR as a line agency of the state, (2) operating it as a state public corporation or authority, or (3) leasing it out for operation by a private party. We examine these three alternatives in the following paragraphs.

Three Possible Alternatives

The Railroad as a State Line Agency

Under this approach, the state would take title to the railroad in a manner similar to state ownership of such other transportation facilities as airports, the Marine Highway System, and state highways. However, we should note that the long-term availability of railroad assistance funding from the federal government, either for capital or operating purposes, is very uncertain. There currently exists no trust fund for railroads as there is for airports or highways.

Under this alternative, the Alaska Railroad would logically be made a division or some other unit of the Alaska Department of Transportation and Public Facilities. The railroad personnel would therefore become employees of the state with all of the benefits available to other state employees.

Policy direction for the Alaska Railroad as a state line agency would come from the governor, from the legislature through normal legislative processes, and from the commissioner of the department involved.

There are several advantages to establishing the Alaska Railroad as a state line agency. The management lines of authority and responsibility would be clear. The institutional structures and resources of the State of Alaska could be readily available for use on the railroad. Alaska Railroad employees would have the fringe benefits and other advantages of state employment, including reasonable job protection. Since the railroad already has a cadre of experienced and trained operational personnel, the transition from federal agency status to state agency status would be easier than other alternatives.

However, there are also significant disadvantages in organizing the railroad as a state line agency. The ARR would encounter most of the same limitations as a state agency as it now does as a federal agency. One of the most critical limitations would be the inability to obtain essential capital investment funds except by state appropriations. The competitive issues related to marketing, management flexibility, state agency regulations, procedures and requirements; the potential for even more direct political influence on operational decisions; and the public-service-versus-business-orientation questions are all disadvantages of this approach.

While the state agency alternative should be considered, it clearly does not meet most of the criteria established for a viable railroad organization. If the Alaska Railroad is to adequately fulfill its transportation role within its technological limitations, a state agency organizational structure is the least desirable of the three alternatives discussed in this report. It would be unfortunate if the State of Alaska were to place the Alaska Railroad in an organizational structure that perpetuated the limitations of federal agency status.

The Railroad as a State Public Corporation or Authority

There are precedents for this approach, both nationally and internationally. The West Virginia Railroad Maintenance Authority and the British Rail Corporation, with some variations, will serve as examples.

The West Virginia Railroad Maintenance Authority. The State of West Virginia has since 1975 owned and operated a railroad[17] similar in some ways to the ARR. The West Virginia Maintenance Authority (WVMA) consists of seven part-time members, including the governor as an ex-officio member. The other six members are appointed by the governor, with the consent of the state senate, for staggered 6-year terms. The authority selects its own officers and appoints an executive director (the chief administrative officer). The employees of the authority in West Virginia work for the state and are non-union.

The WVMA has all the powers needed to own and operate a railroad. These powers include the ability to plan, carry out projects, acquire property, sell or transfer property, contracts, and sue or be sued. The WVMA may raise capital via railroad authority revenue bonds. It may also acquire railroad rights in other states. In addition, the authority has the power of eminent domain.

The railroad experience in West Virginia has been generally successful, and with some modification, lessons learned there may be applicable to Alaska.[18]

The British Rail Corporation. Since its inception in the late 1940s, British Rail has operated as a profit-oriented transportation company, providing both freight and passenger service. A government-appointed chairman and an autonomous board of directors provide general policy for running the corporation, with each director responsible for a particular facet of the operation (passenger, maintenance, capital investment, etc.).

British Rail's chief executive is responsible to the board and the chairman, at the same time serving as a member of the board. The principal officers of British Rail serve at the pleasure of the Chief Executive.

The levels and nature of British Rail's passenger service are negotiated between the government and the corporation, with the government paying for passenger service provided.

British Rail's capital investment package overseen by the Minister of Transport includes a 5-year plan, the first 3 years of which are fixed. This establishes the capital limits, within which investments must fall. British Rail can only borrow through the government, and major projects must be approved by the Minister of Transport.

The ministry of Transport, through its Railways Division, oversees the capital investment program of British Rail. It also has some safety responsibilities. Regulation is not institutionalized. The marketplace drives most policy decisions of British Rail.

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[17] The West Virginia Railroad carries no commercial passengers.

[18] A copy of the West Virginia Maintenance Authority Act is on file at the Alaska Department of Transportation and Public Facilities.

Like the West Virginia Railroad Authority, the British Rail Corporation offers a potential organizational model for the Alaska Railroad. If the Alaska Railroad, under state jurisdiction, were organized as an authority or public corporation under carefully worded state legislation, most of the federal agency limitations could be removed. Properly established under this approach, the Alaska Railroad could meet all of the criteria previously outlined for a state railroad organization.

The principal advantages of a public corporation or authority alternative are an ability to obtain access to required capital funds and freedom to manage and operate the railroad within policies established by a board. Management can be given flexibility and responsibility and can also be held accountable for its decisions. Passenger service can be accounted for separately and not subsidized by freight service. The state could determine the appropriate levels, locations, and other areas of passenger train service in accordance with their willingness to pay for the service selected. The freight rail service could be marketed and required to meet fully allocated costs. Thus, under this organizational scheme, it might be possible to reach a compromise between the public service and business purposes of the railroad.

A State Railroad with Private Operations

A third alternative would be for the State of Alaska to own the railroad and contract with private enterprise to provide for operations. The main difference between this and the other alternatives is the operation of the Alaska Railroad by a private organization.

Several states, such as South Dakota and Oklahoma, are using this approach. These states, among others, have experienced abandonment of significant rail lines that they considered essential to their economy and transportation systems. These are using state and federal funds to acquire and rehabilitate extensive rail lines. The Department of Transportation, as a representative of the state, takes title to the rail property (usually excluding rolling stock). The state then selects a private railroad with the required management experience, skills, and interest in operating its equipment over the line to furnish shippers and receivers with rail service. An operating agreement is negotiated with the private common carrier for rail service. The operational limitations of the railroad can be whatever the state and the railroad agree upon.

The negotiated operating agreement can include such provisions as the assignment of maintenance responsibilities; liabilities; frequency, level, and type of rail service; car supply; revenues; and costs. Thus, all of the appropriate criteria for a state railroad organization can be reflected in the operational agreement. This can even extend to the provision of required capital.

A major advantage of this approach is that once the operating agreement has been negotiated, the state has only a supervisory or overseer responsibility, plus whatever financial requirements have been determined by the negotiations. The railroad operations can include public service rail requirements as well as being performance based.

A substantial difficulty with this alternative for the Alaska Railroad is that no private railroad carrier is operating within the state. Too, there is the problem of the existing Alaska Railroad personnel. While the present railroad employees have the necessary knowledge of railroad operational peculiarities in Alaska, these are federal agency employees, with long-term rights rather than private employees whose rights are subject to negotiation. This could present such a significant liability to prospective private operators that it might be difficult to find interested parties. This approach, therefore, may be impractical unless the responsibility for the current Alaska Railroad personnel is assumed by the Federal Railroad Administration, while a private carrier, with the necessary qualifications, can be attracted as the operator. However, no one knows at this time whether or not such a private operator exists.

One variation to the alternatives described above is a concept under consideration in Iowa. It is an old concept which has proved successful in other organizations but which is new in its application to railroading. It involves the use of a general partner and limited partnerships.

A limited partnership is a very flexible institutional arrangement which could potentially attract substantial private capital. A major consideration in developing this institutional approach is the designation of the general partner. In order to legally establish a limited partnership, at least one financially responsible general partner must be found or established. The State of Alaska could establish an organization which could become the general partner for this railroad venture. Although limited partners are not subject to liability beyond their investment in the partnership, there is usually no limit to the liability of the general partner.

A limited partnership is, by law, a nontaxable entity. All gains or losses from the venture flow directly back to the investors (partners) for tax purposes. Partnerships are thus attractive because (1) there is no double taxation of income as with corporations and(2) partners can take full tax advantage of losses, depreciation allowances, and tax credits. The ability to take advantage of depreciation allowances will become more important if the Reagan Administration's accelerated depreciation proposal is enacted. It would be necessary, of course, to examine legal constraints in Alaska for public involvement in limited partnerships. In Iowa, there is no apparent constitutional prohibition against public involvement in such arrangements.

It may be possible in such a limited partnership to attract rail users, businessmen, private individuals, and Alaska Railroad employees, among others. Thus, it would be advantageous to those with direct rail interests to see the Alaska Railroad succeed as a business venture while offering only limited individual liability. The idea and concept may be worthy of further consideration.

Alaska Railroad Transition

Transition Legislation and Problems

As noted earlier, the Federal Railroad Administration (FRA) has determined that the original intent of the Enabling Act for establishing and operating the Alaska Railroad has been met and federal responsibilities discharged. Thus, for the past several years, several federal administrations and the Department of Transportation have discussed divestiture of the Alaska Railroad by the federal government. However, it has only been since January 1981 that the decision was made to prepare legislation for such a divestiture and implementation steps taken.

The FRA has shown some urgency in getting the transfer legislation introduced and passed. This urgency results from a reduction of employees in the Federal Railroad Administration, as well as desire to cut the capital fund request of the Alaska Railroad. FRA's schedule calls for passing the legislation this fiscal year. The legislation proposes that the State of Alaska meet the transfer conditions within one year of enactment of the legislation. The draft legislation also provides for transferring the Alaska Railroad to other interested parties should the State of Alaska not meet the conditions for transfer within this time period.

The proposed legislation further embodies a number of discretionary "strings" attached to the transfer which would enable the federal government to ensure that the State of Alaska own and operate the Alaska Railroad in a manner commensurate with FRA's preconceived ideas. Failure by the state to conform to the provisions of the Act would be grounds for the FRA to reclaim the railroad within a 10-year period. The rationale for the continuing federal interest in the Alaska Railroad is predicated upon the offer of a no-cost transfer to the state.

In summary, there are numerous problems associated with the transfer of the Alaska Railroad from federal to state ownership. Federal transfer legislation will likely be passed by Congress before these problems have been resolved. The U.S. Department of Transportation has not determined the land, the structures, the right-of-way, nor equipment to be included in the transfer. Arrangements have not yet been made to provide for an orderly transfer of the employees from federal agency status. There is no organizational framework established within Alaska to accept the ownership, operation, or employees of the railroad. The FRA is anxious to relinquish ownership, operation, employee, and funding responsibilities of the Alaska Railroad. This could potentially result in postponement of major ARR operational decisions. Such postponement could jeopardize the smooth long-range operation of the railroad and perhaps result in lost traffic—an event not in the best interest of Alaska. In addition, the employees are left in a state of "limbo," not knowing for whom they will work, if they will have a job, how the transition will occur from federal employment, or what happens to the benefits received as a federal employee. The employees lack information, and many of their questions cannot be satisfactorily answered at this time.

State legislation will probably be required to accept the transfer of the Alaska Railroad. The state, however, has made no decision on the transfer question or on the organizational structure required to own and/or operate the railroad. The current railroad assets, obligations, and liabilities have not clearly been defined, which leaves the state with inadequate information on the short- and long-term financial and other requirements accompanying the proposed transfer.

The railroad needs to continue operation without disruption, since disruption would detrimentally affect the state's economy and economic development. And this would come when economic activity is quickly increasing .

These are some of the more important transitional problems. Unfortunately, these problems have not yet received the attention needed to determine their full implications. Time and additional efforts are required to provide the Alaska decision-makers with the information necessary to act in the best interest of the state. The complexities and extent of these transitional problems are likely to result in legal actions and court adjudication. A transitional bridge is needed to facilitate the smooth transfer of the Alaska Railroad from the federal government.

An Orderly Transition

Even if we assume that satisfactory federal legislation can be drafted and passed by Congress for the transfer of the Alaska Railroad from federal to state ownership, there will remain a significant period for transition. Along with land, employee, competition, and various obligation problems, the smooth transition to state ownership and operation is a most perplexing problem. How the transition is handled will have either a positive or adverse impact—long term as well as short term—on the railroad and its operations as well as on the State of Alaska.

During this transitional period, certain needs must be met if the railroad is to fulfill its important and special transportation function in Alaska. These include the need to:

- Continue the freight and passenger operation of the Alaska Railroad.
- Preserve as many potential operational and organizational alternatives for the state as possible.
- Provide adequate legal protection for the Alaska Railroad throughout the transitional period.
- Provide interim protection and transitional assistance for the employees of the Alaska Railroad.
- Provide adequate time for adjudicating the legal issues which have been raised by the transfer question, such as land title, equipment and railroad property, employee rights and benefits; existing or pending court cases, railroad agreements, contracts, and obligations.
- Establish an orderly process and procedure for solving problems which have been identified or which may arise during the transition.
- Provide the time required for the state administration and the legislature to consider the issues, to seek solutions to problems, and to deliberate carefully on the implications of each proposed state legislative bill without being faced with a stringent schedule and a crisis-type atmosphere.

Given the general mood of the Reagan Administration and the Congress to reduce federal expenditures and the federal perception of great Alaskan wealth, it is quite possible that Alaska Railroad transfer legislation will be passed this year. The State of Alaska will probably be faced with the need for a package of legislation which sets the tone and organizational framework for state ownership of the railroad if Congress passes transfer legislation. Under these circumstances, there is a genuine need to provide for an orderly transition from federal to state ownership. Sufficient time must be allowed to work out the myriad transitional problems.

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FEDERAL REVENUES AND SPENDING IN ALASKA

INTRODUCTION

This *Review* looks at (1) how much the federal government spent in Alaska in 1980 and earlier years, as compared with how much it collected here in taxes, and (2) how this flow of federal money into and out of Alaska affected the state's economy.[1]

Most of the information presented here is from a study we recently did for the Alaska Statehood Commission.[2] The commission asked us to examine the fiscal relationship between Alaska and the federal government, looking particularly at how development of the Prudhoe Bay oil field has changed that relationship.[3]

We recognize as we write this in early 1982 that both federal spending and revenue collection in Alaska will be different this year than in 1980, as a result not only of changes in federal tax laws and spending policies but also the falling price of oil. Nevertheless, we feel that the detailed 1980 figures we present here still provide useful information on and insight into the fiscal relationship between Alaska and the federal government. In a concluding section we look at likely changes in federal spending and collection here in 1982 and the coming years.

In the following pages we present a number of statistics that are interesting in themselves; but taken together, the figures reveal how federal spending and taxation affect Alaskans and their economy. In the Conclusions section, we discuss what we find most significant about these figures, and assess the place of the federal government in Alaska's economy today.

THE FEDERAL GOVERNMENT IN ALASKA

The federal government has been a mainstay of

This *Review*, after briefly describing the role of the federal government in Alaska's economy over the past several decades, looks in detail at federal spending in Alaska in 1980, breaking out categories of federal spending: expenditures of various federal agencies; largest grant programs in the state; and federal wages, jobs and transfer payments by census division. It also provides information on levels of federal spending and numbers of federal jobs in Alaska in earlier years.

Turning next to federal revenue collection here in 1980, we discuss the largest sources of federal revenues in Alaska, including both those paid by corporations and by individual Alaskans, and assess the effects of the progressive federal income tax structure on Alaskans' incomes.

We then look at the net effects of federal spending and taxation on numbers of jobs in Alaska. Finally, we discuss the significance of the statistics presented here, and talk about likely changes in federal spending and collection in Alaska in the coming years.

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[1] In this *Review* we consider only direct federal spending in Alaska; the federal government also supports the state economy through loan programs.

[2] *Federal Revenues and Spending in Alaska*, by Scott Goldsmith and J. Phillip Rowe, Institute of Social and Economic Research, University of Alaska, September 1981. The views expressed here, however, are those of ISER and are not necessarily shared by the commission.

[3] The commission was established in 1980 to examine the relationship that has developed between Alaska and the federal

(Footnote 3 continued)
government since Alaska became a state in 1959.

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FEATURE

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Federal Revenues and Spending in Alaska
(Edited by Linda Leask)

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Alaska's economy since World War II, when the Department of Defense recognized that Alaska's location would make it strategically important to U.S. defense in the coming years. During and after the war, the Defense Department established air bases, missile sites, communications systems, and other military facilities throughout the state. An Alaskan economist has described these Department of Defense activities as the biggest "industry" in Alaska throughout the 1950s and 1960s.[4]

Apart from federal activities, Alaska's economy has historically been driven by production of natural resources—fur, gold, fish, timber, and, most recently, petroleum. But in the 1950s and 1960s, the economic activity generated here by natural resource industries was much less than that generated by activities of the federal government in Alaska—primarily activities of the Department of Defense and secondarily activities of various federal agencies responsible for managing the vast federal land holdings in Alaska.

In the 1970s, natural resource development once again assumed prominance in Alaska's economy, as development of the Prudhoe Bay oil field multiplied state government revenues and brought on sharp increases in the number of jobs in the state. By 1980, the federal government was no longer the dominant force in the state economy that it had been two decades earlier, but, as shown in the following pages, the federal government in the 1980s is still an important force in an economy that is otherwise very much subject to the vicissitudes of natural resource development.

Federal Spending in Alaska

Federal Spending Statewide[5]

Of the $2.2 billion the federal government spent in Alaska in 1980, 78 percent was for operational

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[4] See George W. Rogers, "Alaska's Economy in the 1960s," *Alaska Review of Business and Economic Conditions* 7 (December 1970).

[5] The figures in this section represent obligations of various federal agencies operating in Alaska in 1980, as opposed to amounts actually spent—the difference being that some money obligated in a given year may not be spent until the following year. Also, the figures presented here have been adjusted to include only money actually spent in Alaska; in some instances, money that is budgeted for Alaska operations is spent outside the state—for supplies and equipment, for instance.

expenses and 22 percent for grants. The biggest federal spender in Alaska that year was the Department of Defense, with expenditures of $760 million; the second largest was the Interior Department, which spent about half that amount. One-third of federal grant money in Alaska in 1980 was for highway planning and construction. Other grant programs that received substantial shares of federal money included education programs, state-operated welfare programs, and programs for the unemployed.

In Alaska and across the country, the federal government spends money primarily for its own operations and secondarily for grants to state and local governments and private organizations. Operational costs include all the federal government's costs of providing services, paying its civilian and military employees, maintaining and constructing federal facilities, and making transfer payments to individuals. Federal grants are mainly monies the federal government distributes to state and local governments to help pay for a wide range of public programs. A smaller portion of federal grants go to private, nonprofit organizations, and to individuals.

Table 1

Direct Federal Spending in Alaska, FY 1980

(in millions of dollars)

Categories of Expense	Amount	Percentage of Total
Operations		
Military Payroll	$ 303.0	13.8%
Civilian Payroll	422.7	19.2
Direct Transfers[a]	178.1	8.1
Other Operating Exp.[b]	823.0	37.4
Total Operations	$1,726.9	78.5%
Grants		
Grants to State, local, and private agencies	410.2	18.6
Indirect Transfers[c]	63.7	2.9
Total Grants	$473.9	21.5%
Total Expenses	$2,200.8	100%

[a] Direct federal transfer payments are those, like Social Security payments, that the federal government itself pays its citizens. See Table 8 for a list of direct federal transfer programs.

[b] Includes maintenance, procurement, and other operations costs not specifically included in other categories, as well as costs of operating the Alaska Railroad and the U.S. Postal Service in Alaska.

[c] Indirect federal transfers are monies the federal government contributes to transfer programs that the State of Alaska administers and shares costs of. See Table 8 for a list of state-administered programs partially paid for by the federal government.

Sources: Community Services Administration, *Geographic Distribution of Federal Funds in Alaska, 1980*; Bureau of Economic Analysis, "Major Sources of Personal Income."

Table 1 shows that the federal government spent about $2.2 billion in Alaska in fiscal 1980. About $1.7 billion, or 78 percent, of that total was for operational expenses. Nearly half a billion, or 22 percent, was for grants.

The federal government's biggest expenses in Alaska in 1980 were $725 million for military and civilian payrolls and $823 million for other kinds of operating expenses. Those two categories of expense accounted for about 70 percent of federal spending in the state that year. Another $178 million, or about 8 percent of the total $2.2 billion, was paid directly to Alaskans in Social Security and other transfer payments.

Federal grants in Alaska in 1980 totalled about $474 million, with most of that money going to the state and local governments, and smaller portions to individuals and nonprofit organizations. Table 2 lists the largest federal grant programs in Alaska in 1980. Federal aid for transportation planning and construction garnered by far the largest share of federal grant money here in 1980—$136 million, or nearly one-third of the total. Most of that $136 million was specifically for highway planning and construction. Alaska has historically received substantial federal highway grants, because these grants are determined in part by the proportion of federal land in the state; until recent years, about 90 percent of the land in Alaska was owned by the federal government, and today the federal government still owns about 60 percent of land in the state.

Other programs that received smaller but still significant shares of federal grant money in Alaska in 1980 were education programs, state-operated welfare programs, and programs for the unemployed. Education programs received approximately $67 million, or about 14 percent of total grants. The largest federal grants for education in 1980 went to the School Aid to Federally Affected Areas program, which provides money to schools in areas where the federal government owns lands that are exempt from local taxes.

Federal contributions to three state-operated welfare programs made up about 13 percent of federal grants here in 1980. The Food Stamp, Medicaid,

Table 2

Largest Federal Grant Programs in Alaska, FY 1980

(in millions of dollars)

Categories of Programs	Amount	Percentage of Total Grants[a]
Aid for Transportation Planning & Construction	$136.1	29%
Highway Planning & Construction	108.6	
Airport Planning	17.2	
Other Transportation	10.3	
Aid for Education	$66.9	14%
School Aid to Federally Affected Areas	48.9	
School Nutrition Programs	5.8	
Head Start Program	3.3	
Other Aid to Education	8.9	
Aid to State-Administered Welfare Programs	$63.7	13%
Food Stamp Program	25.6	
Medicaid	22.4	
Aid to Families w/Dependent Children	15.7	
Aid to Unemployed & Underemployed	$54.8	12%
Comprehensive Employment & Training Program (CETA)	29.5	
Econ. Develop. Grants	3.9	
Unemployment Ins. Admin.[b]	10.8	
Other	10.5	
Aid to Alaska Natives	$26.4	6%
Indian Employment & Training Program	12.0	
Indian Employ. Assist.	6.0	
Other Native Assist.	8.4	
Other Programs[c]		26%

[a] Alaska received a total of $474 million in federal grants in 1980; this column shows what proportions of that total the largest grant programs received.

[b] Federal grants to the state government for administration of the unemployment insurance program.

[c] There were more than 200 grant programs in Alaska in 1980, 72 of which received at least $500,000 each.

Source: Community Services Administration, *Geographic Distribution of Federal Funds in Alaska, 1980.*

and Aid to Families with Dependent Children (AFDC) programs received about $64 million of federal money that year. The federal government pays half the costs of the Medicaid and AFDC programs in Alaska, and all but administrative costs of the Food Stamp program.

Programs to help the unemployed in Alaska cost the federal government about $55 million in 1980. Chief among these was the Comprehensive Employment and Training (CETA) program, under which the federal government encourages employers to hire the chronically unemployed by helping pay the wages of such workers.

An additional 6 percent of federal grant money in Alaska in 1980 went to aid programs specifically for Alaska Natives, including employment and training programs.

The balance of federal grant money—about one-fourth of the total $474 million—was divided among the remaining grants programs in the state. There were more than two hundred federal grant programs here in 1980, and seventy-two of these received more than $500,000 each.

Table 3 shows how federal operational and grants spending changed in Alaska between 1974 and 1980. During that 6-year period, overall federal spending in Alaska nearly doubled, growing from $1.2 billion to $2.2 billion. Operational expenses alone grew about 115 percent, increasing from $805 million to $1.7 billion. Federal grant spending in Alaska also generally increased, although not as much as operational spending. In 1974, grants accounted for nearly 30 percent of all federal spending in Alaska; by 1980, they made up only 22 percent.

The federal agencies responsible for spending $2.2 billion in Alaska in 1980 are listed in Table 4. The Department of Defense, which spent $760 million, or nearly 35 percent of all federal money expended here that year, was by far the largest single spender. This is not surprising; as we discussed earlier, defense spending in Alaska has been substantial since World War II. The Air Force spent about half of the money expended for defense in Alaska in 1980.

Table 3

Federal Expenditures for Operations and Grants in Alaska, FY 1974–1980

(in millions of dollars)

Fiscal Year	Operations	Grants	Total
1980	$1,726.9	$473.9	$2,200.8
1979	1,510.8	421.4	1,932.2
1978	1,354.8	398.3	1,753.1
1977	1,087.8	457.0	1,544.8
1976	1,113.6	254.5	1,368.1
1975	947.5	367.6	1,315.1
1974	805.4	320.1	1,125.5

Sources: Fiscal years 1974-1976, Community Services Administration, *Federal Outlays in Alaska*; fiscal years 1977-1980, Community Services Administration, *Geographic Distribution of Federal Funds in Alaska.*

The next largest spender in Alaska in 1980 was the Department of the Interior, with expenses of about $350 million. The Department of the Interior spends significant sums in Alaska because its various agencies manage the federal government's huge land holdings in the state. In most earlier years, the Bureau of Land Management (BLM) spent more money here than any other Interior agency, because it had the largest share of responsibility for federal lands. In 1980, however, expenditures of the U.S. Geological Survey (USGS) were the largest because USGS was overseeing a federal petroleum exploration program in the National Petroleum Reserve on the North Slope. The USGS spent about half of all money expended by the Department of the Interior here in 1980.

Table 4 shows that the departments of Transportation and Health and Human Services each spent about $300 million in Alaska in 1980. Within the Department of Transportation, the agency with the largest budget was the Federal Highway Administration; as we noted in our discussion of grant programs, most of this money was for federal highway grants to the state. In the Department of Health and Human Services, the biggest spender in 1980 was the Indian Health Service, which spent about $120 million to

Table 4

Federal Expenditures in Alaska, by Department, FY 1980

(in millions of dollars)

Department	Expenditures	Percentage of Total Expenditures
Defense	$762.3	34.6%
Air Force	394.9	
Army	261.5	
Navy	53.4	
Corps of Engineers	26.6	
National Guard	25.9	
Interior	$346.8	15.8%
Geological Survey	167.8*	
Bureau of Indian Affairs	89.2	
Bureau of Land Mgt.	42.9	
Fish & Wildlife Svc.	19.5	
Office of the Secretary	12.3	
National Park Service	7.8	
Other Agencies	7.3	
Transportation	$291.4	13.2%
Federal Hwy. Admin.	109.3	
Federal Aviation Admin.	81.8	
Coast Guard	55.6	
Alaska Railroad	34.7	
Other Agencies	10.0	
Health & Human Services	$279.8	12.7%
Indian Health Svc. & Facilities	121.1	
Social Security Admin.	93.4	
Health Care Financing Admin.	39.9	
Office of the Secretary	14.8	
Other Agencies	6.9	
Labor	$82.3	3.7%
Employ. Training Admin.	77.0	
Other	5.3	
Agriculture	$81.3	3.7%
Forest Service	38.4	
Food & Nutrition Svc.	33.7	
Other Agencies	9.2	
Education	$71.6	3.3%
School Assist. Federally Affected Areas	48.9	
Educationally Deprived Children's Program	5.2	
Indian Education Grants	3.9	
Other Programs	13.6	
Postal Service	$55.0	2.5%
Commerce	$46.4	2.1%
Nat'l. Oceanic & Atmospheric Admin.	38.9	
Econ. Develop. Admin.	4.8	
Census Bureau	1.8	
Other Agencies	.9	
Veterans Admin.	$37.1	1.7%
Treasury	$34.9	1.6%
Other Departments	$112.0	5.1%
Total	$2,200.8	100.0%

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*Expenditures of the Geological Survey were exceptionally large here in 1980 because that agency was carrying out a petroleum exploration program in the National Petroleum Reserve on the North Slope.

Source: Community Services Administration, *Geographic Distribution of Federal Funds in Alaska, 1980.*

provide services to Alaska Natives and maintain health service hospitals and clinics. The Social Security Administration spent about $93 million here in 1980, largely for payments to retired or disabled Alaskans.

Table 5

Federal[a] and Total Wages and Salaries in Alaska, by Census Division,[b] 1979

(in millions of dollars)

Census Division	Federal Wages & Salaries[a]	All Wages & Salaries	Federal as Percentage of Total
Aleutian Islands	$ 43.9	$ 86.8	51%
Anchorage	361.3	1,794.6	20
Angoon	.4	4.3	9
Barrow-North Slope	2.1	193.4	1
Bethel	10.1	39.7	25
Bristol Bay Borough	7.1	17.4	41
Bristol Bay	2.1	23.8	9
Cordova-McCarthy	2.1	25.2	8
Fairbanks	118.1	543.4	22
Haines	.7	8.0	9
Juneau	23.6	204.2	12
Kenai-Cook Inlet	3.7	154.5	2
Ketchikan	8.6	114.5	8
Kobuk	3.5	13.9	25
Kodiak	13.0	93.0	14
Kuskokwim	4.6	7.5	61
Matanuska-Susitna	2.9	56.8	5
Nome	6.8	35.3	19
Outer Ketchikan	2.3	9.1	25
Prince of Wales	.9	14.5	6
Seward	2.8	24.5	11
Sitka	15.9	86.1	18
Skagway-Yakutat	2.2	14.5	15
Southeast Fairbanks	19.1	31.5	61
Upper Yukon	.8	4.2	19
Valdez-Chitina-Whittier	1.9	49.0	4
Wade Hampton	3.2	7.5	43
Wrangell-Petersburg	4.8	46.0	10
Yukon-Koyukuk	17.9	61.0	29
Alaska	$686.4	$3,764.4	18%
U.S.			6%

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[a] Includes both military and civilian payrolls.

[b] This table shows census divisions as they existed in 1979; in the 1980 census, the U.S. Bureau of the Census changed the boundaries of some divisions and reduced the total number of divisions from 29 to 23.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, *Local Area Personal Income, 1974-1979*, June 1981.

Together, the departments of Defense, Interior, Transportation, and Health and Human Services spent about 80 percent of all federal money expended here in 1980. The remaining 20 percent was divided among various departments, the chief of which were the departments of Labor, Education, and Agriculture.

Federal Wages and Jobs

In the preceding section we looked at overall federal spending in Alaska; in this section we focus on a single component of that federal spending—federal wages—and how those wages translate into federal jobs.

In 1979, the 41,200 federal civilian and military jobs in Alaska made up 22 percent of all jobs in the state, and federal wages accounted for 18 percent of all wages—a proportion three times larger than the national average. Federal jobs made up as little as 5 percent and as much as 60 percent of all jobs in various Alaska census divisions in 1979. From 1959 to 1979, federal jobs declined as a proportion of all jobs in Alaska, because numbers of military jobs here dropped while other jobs, particularly those in the support industries, increased significantly.

Table 5 shows federal wages as a proportion of total wages in Alaska and in each of its census divisions in 1979, the most recent year for which we have such breakdowns by census division. Table 6 shows how those wages translated into jobs.

In 1979, the federal government paid about $690 million in military and civilian wages to 17,742 civilian and 23,323 military employees in Alaska. Federal wages made up about 18 percent of all wages in the state that year, while federal jobs made up 22 percent of all jobs. The proportion of federal jobs to all jobs in the state is higher than the proportion of federal wages to all wages, because military wages are generally lower than civilian wages. As the table shows, federal wages made up only 6 percent of all wages nationwide in 1979.

More than 70 percent of the 41,265 federal jobs in Alaska in 1979 were concentrated in the vicinities of Anchorage and Fairbanks, where there are large military bases; Anchorage is also the state headquarters for most federal civilian operations. Federal civilian jobs in 1979 accounted for 13 percent of all civilian jobs in Anchorage and 11 percent of civilian jobs in Fairbanks.

In other Alaskan communities, with smaller populations and fewer jobs, the importance of federal jobs and wages varied greatly in 1979. Also, relative numbers of civilian and military jobs varied among

Table 6

Federal and Total Jobs in Alaska, by Census Division,[a] 1979

Census Divisions	Federal Jobs			Total Jobs		Federal Civilian as Percentage of all Civilian	All Federal Jobs as Percentage of Total Jobs
	Civilian[b]	Military	All Federal	Civilian	Civilian & Military		
Alaska	17,942	23,323	41,265	166,529	189,852	11%	22%
Aleutian Islands	704	2,175	2,879	3,317	5,492	21	52
Anchorage	9,758	11,862	21,620	77,565	89,427	13	24
Angoon	8	3	11	247	250	3	4
Barrow-North Slope	248	17	265	5,549	5,566	4	5
Bethel	411	15	426	3,459	3,474	12	12
Bristol Bay Borough	84	369	453	783	1,152	11	39
Bristol Bay	107	0	107	1,689	1,689	6	6
Cordova-McCarthy	37	54	91	1,137	1,191	3	8
Fairbanks	2,319	5,580	7,899	21,112	26,692	11	30
Haines	11	0	11	476	476	2	2
Juneau	1,177	275	1,452	10,450	10,725	11	14
Kenai-Cook Inlet	104	55	159	6,779	6,834	1	2
Ketchikan	265	188	453	5,317	5,505	5	8
Kobuk	248	17	265	1,364	1,381	18	19
Kodiak	286	892	1,178	4,831	5,723	6	20
Kuskokwim	78	55	133	504	559	15	24
Matanuska-Susitna	97	147	244	3,078	3,225	3	8
Nome	177	41	218	2,208	2,249	8	10
Outer Ketchikan	54	0	54	512	512	11	11
Prince of Wales	30	0	30	763	763	4	4
Seward	69	15	84	1,359	1,374	5	6
Sitka	596	193	789	3,934	4,127	15	19
Skagway-Yakutat	68	12	80	1,105	1,117	6	7
Southeast Fairbanks	335	849	1,184	1,130	1,979	30	60
Upper Yukon	35	28	63	386	414	9	15
Valdez-Chitina-Whittier	46	42	88	2,180	2,222	2	4
Wade Hampton	134	13	147	872	885	15	17
Wrangell-Petersburg	199	14	213	2,347	2,361	8	9
Yukon-Koyukuk	257	412	669	2,076	2,488	12	27

[a] See note b, Table 5.

[b] Federal civilian jobs here include both military-related and other federal civilian jobs.

Sources: Alaska Department of Labor, *Statistical Quarterly*, 1978; and *Alaska Population Overview*, December 1979.

census divisions. In some census divisions virtually all federal employees were military personnel, and in others they were mainly civilian workers. In Angoon and Haines in southeastern Alaska, and on the North Slope, federal jobs made up less than 5 percent of all jobs. Conversely, in the Aleutians, in the Bristol Bay Borough, and in the Southeast Fairbanks census division (which includes Glennallen, Delta Junction, and other communities southeast of Fairbanks), federal civilian and military jobs made up 30 to 60 percent of all jobs.

Table 7 shows numbers of federal jobs in Alaska from 1950 through 1979. The table breaks all jobs into basic and support jobs, and shows federal jobs as a proportion of all jobs and of just basic jobs. Basic jobs are, as the name implies, the foundation of the economy—jobs in industries that produce exportable commodities. Basic industries in Alaska include fishing, logging, farming, mining (including petroleum development), manufacturing, tourism, and some construction and transportation.[6] We also consider federal government jobs in Alaska as basic jobs. Although the federal government produces no commodities as such, it produces services that are "exportable" in the sense that they generally benefit all Americans.

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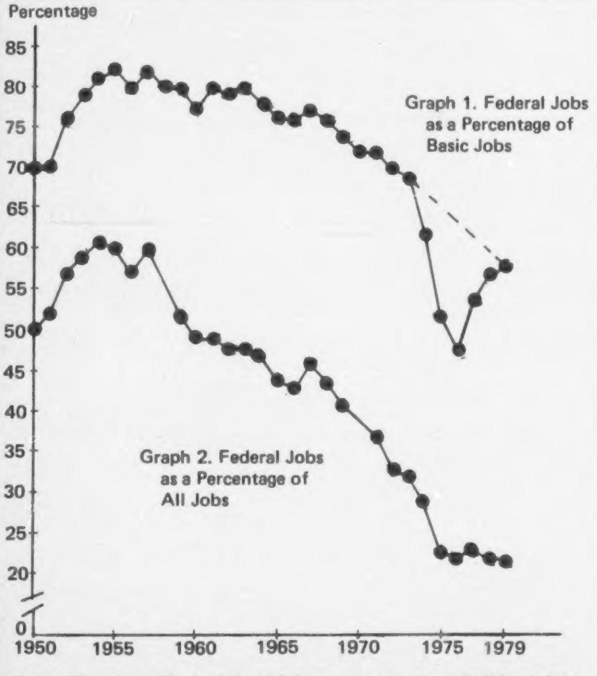
[6] See note b, Table 7.

Support jobs, on the other hand, provide services to local residents rather than produce commodities for export. Support industries here include retail and wholesale trade, finance, real estate, services, utilities, transportation, and insurance. We also classify state and local government jobs as support jobs, because they provide services only to Alaskans.

As Table 7 shows, federal military and civilian jobs made up more than 70 percent of all basic jobs in Alaska in 1950, and 80 percent of basic jobs when Alaska became a state in 1959. By 1979, federal jobs as a proportion of basic jobs had declined, but still constituted half of the basic jobs in the state.

From 1959 through 1979, federal jobs as a proportion of all jobs—both basic and support—declined more rapidly, from about 50 percent to 22 percent. This decline occurred because: (1) there were fewer federal jobs in Alaska in 1979 than there had been in 1959, and (2) other kinds of jobs in the state, particularly support jobs, increased significantly during that same period. Numbers of military personnel assigned to Alaska peaked at about 50,000 during the Korean War in the early 1950s; by the time Alaska had become a state in 1959, they had declined to 34,000. By 1979, total military personnel in Alaska had fallen to 23,000. Federal civilian employees, on the other hand, increased somewhat between 1959 and 1979, growing from about 17,000 to 18,000. This increase in federal civilian jobs in Alaska did not, however, offset the decline in military jobs, so that between 1959 and 1979 total federal jobs in Alaska dropped from nearly 51,000 to 41,000—a decline of 20 percent.



Note: The sharp dip in federal jobs as a proportion of all basic jobs in the mid-1970s occurred because thousands of temporary basic jobs were created during construction of the trans-Alaska pipeline. The dotted line in Graph 1 shows what the trend of federal jobs to all basic jobs in Alaska would have looked like in the mid-1970s if the effects of pipeline construction jobs were excluded.

Figure 1. Federal Jobs as a Percentage of Basic Jobs and of All Jobs in Alaska, 1950-1979

During the period when federal jobs here were declining, other kinds of jobs were on the increase. Basic jobs other than federal jobs more than doubled between 1959 and 1979, growing from 12,500 to more than 29,000. But support jobs grew at a much faster rate than basic jobs. Over that 20-year period, support jobs in Alaska grew from less than 34,000 to more than 119,000—an increase of 250 percent.

Figure 1 graphically shows the decline in the relative importance of federal jobs to basic jobs and to all jobs in Alaska between 1950 and 1979.

Graph 1 of the figure shows the changing proportion of federal jobs to basic jobs. Federal jobs as a proportion of basic jobs peaked at more than 80 percent in the 1950s, then gradually declined to about 70 percent by 1973. Between 1973 and 1976, the proportion dropped to less than 50 percent. By 1979, it once again increased to nearly 60 percent. The federal share of basic jobs dropped off sharply in the mid-70s because construction of the trans-Alaska pipeline created thousands of temporary construction jobs in the state. After the pipeline was completed, the overall number of basic jobs decreased and federal jobs as a percentage of basic jobs again increased.

Graph 2 in Figure 1 shows the changing proportion of federal jobs to all jobs—both basic and support—in Alaska from 1950 to 1979. We can see that the decline in the federal share of all jobs was much greater during that period than was the decline in the proportion of federal jobs to just basic jobs. As far back as 1967, when federal jobs made up 45 percent of all jobs in the state, the federal government's share began a sharp decline that continued until 1976, and then essentially leveled off in the late 1970s. By 1979, federal jobs made up only about 22 percent of all jobs here.

Federal Transfer Payments

In this section, we look closely at another part of federal spending in Alaska: transfer payments that

Table 7

Total and Federal Jobs in Alaska, 1950-1979
(in thousands)

	Basic Jobs[a]								
	Federal								
Year	Civilian	Military	All Federal	Other Basic[b]	All Basic	Support Jobs[c]	Basic & Support Jobs	Federal Jobs as % of Basic Jobs	Federal Jobs as % of Total Jobs
1979	17.9	23.3	41.2	29.4	70.6	119.1	189.7	58%	22%
1978	18.1	22.5	40.6	30.1	70.7	115.1	185.8	57	22
1977	17.7	25.0	42.7	36.0	78.7	110.4	189.1	54	23
1976	17.9	25.0	42.9	45.7	88.6	107.5	196.1	48	22
1975	18.3	24.9	43.2	40.3	83.5	102.7	186.2	52	23
1974	18.0	27.5	45.5	27.7	73.2	82.5	155.7	62	29
1973	17.1	27.5	44.6	20.2	64.8	72.7	137.5	69	32
1972	17.2	26.4	43.6	18.9	62.5	68.1	130.6	70	33
1971	17.3	30.1	47.4	18.5	65.9	62.3	128.4	72	37
1970	17.1	31.4	48.5	18.6	67.1	57.4	124.5	72	39
1969	16.5	32.3	48.8	17.4	66.2	52.7	118.9	74	41
1968	16.9	32.6	49.5	15.5	65.0	47.4	112.4	76	44
1967	17.4	33.7	51.1	14.8	65.9	44.6	110.5	77	46
1966	17.5	31.0	48.5	15.7	64.2	49.0	113.2	76	43
1965	17.4	33.0	50.4	15.6	66.0	48.0	114.0	76	44
1964	17.2	35.0	52.2	14.5	66.7	43.8	110.5	78	47
1963	16.6	34.0	50.6	13.0	63.6	42.1	105.7	80	48
1962	15.7	33.0	48.7	12.6	61.3	40.3	101.6	79	48
1961	15.6	33.0	48.6	12.5	61.1	38.9	100.0	80	49
1960	15.6	33.0	48.6	14.9	63.5	36.6	100.1	77	49
1959	16.8	34.0	50.8	12.5	63.3	33.6	96.9	80	52
1958	16.8	35.0	51.8	13.0	64.8	31.1	95.9	80	54
1957	17.4	48.0	65.4	13.9	79.3	30.6	109.9	82	60
1956	16.3	45.0	61.3	15.6	76.9	30.0	106.9	80	57
1955	15.7	50.0	65.7	14.8	80.5	28.3	108.8	82	60
1954	15.7	49.0	64.7	15.1	79.8	26.4	106.2	81	61
1953	15.9	50.0	65.9	17.9	83.8	27.1	110.9	79	59
1952	14.5	50.0	64.5	20.7	85.2	27.0	112.2	76	57
1951	13.9	38.0	51.9	21.9	73.8	25.9	99.7	70	52
1950	13.6	26.0	39.6	17.0	56.6	21.9	78.5	70	50

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[a] Basic industries are generally those which produce exportable commodities that drive the economy; these industries include agriculture, forestry, mining (including petroleum development), manufacturing, fishing, tourism, and some elements of construction. We also consider federal civilian and military jobs as basic jobs. Although the federal government does not produce any commodities as such, federal activities produce services for all Americans.

[b] Numbers of basic jobs other than federal jobs shown in this table are estimates which do not include jobs in fishing and tourism, because little historical information exists on numbers of jobs in those two industries. Because jobs in tourism and fishing are not included here, the importance of federal jobs to total basic jobs may be somewhat overstated. However, we have included all construction jobs as basic jobs here, when in fact some construction jobs are support jobs. Thus, the exclusion of fishing and tourism jobs and the inclusion of all construction jobs tend to balance each other, and the pattern of growth in numbers of "other basic jobs" as shown in column 4 is accurate.

[c] Support industries are generally those which do not produce commodities but rather provide goods and services to Alaskans. Support jobs include jobs in retail and wholesale trade, real estate, services, utilities, finance, insurance, and in state and local government. Unlike federal jobs, which are considered basic jobs, state and local government jobs are support jobs because state and local governments provide services just to Alaskans.

Sources: Scott Goldsmith and Lee Huskey, Institute of Social and Economic Research, "Structural Change in the Alaskan Economy: The Alyeska Experience," paper presented at 29th Alaska Science Conference; and Man in the Arctic Program (MAP) model data base.

the federal government makes directly to Alaskans and contributions it makes to state-administered transfer programs.

Federal transfer payments in Alaska totaled $242 million in 1980, with payments to retired persons covered under federal pension plans accounting for roughly half of that total; by far the largest single transfer program in Alaska in 1980 was the Social Security program. Federal contributions to state-operated welfare programs made up one-quarter of total federal transfers in 1980. The importance of federal transfer payments to per capita income varied substantially among the state's census divisions in 1979, making up as little as 4 percent and as much as 30 percent of per capita income in different regions of the state.

Transfer programs are primarily programs under which the federal or state governments make direct payments to individuals, for a variety of reasons. Most such direct federal transfer payments are of two kinds: (1) payments to retired persons covered under federal pension programs , and (2) payments to aged or disabled persons qualified to receive federal help in paying medical or other costs. The federal government also contributes to state-operated welfare programs for poor individuals or families.

Table 8 shows direct federal transfer programs in Alaska in 1980, and state-operated programs to which the federal government contributed. Federal transfer payments totalled $242 million in Alaska in 1980, or about 11 percent of all federal spending here.

By far the largest direct federal transfer program in Alaska in 1980 was the Social Security program, under which retired or disabled Alaskans collected about $74 million. Retired military persons collected $34 million in retirement pay, and retired federal workers collected about $10 million.

Veterans entitled to federal help in paying medical and other costs received about $29 million in Alaska in 1980, while older Alaskans collected about $17 million for medical costs under the Medicare program. Alaska Natives were paid almost $14 million under the Indian General Assistance program .

The federal government also contributed about

Table 8

Transfer Programs with Federal Funding in Alaska, FY 1980

Programs	Amount (in millions of dollars)
Direct Federal Transfer Programs[a]	
Social Security	$73.9
Military retired pay	34.4
Veterans benefits	28.6
Medicare	17.1
Indian General Assistance	13.9
Federal Employee Unemployment & Compensation	10.2
All Direct Transfers	$178.1
Federal Contributions to State-Administered Programs[b]	
Food Stamp Program	$ 25.6
Medicaid	22.4
Aid to Families with Dependent Children (AFDC)	15.7
All Federal Contributions	$ 63.7
Total Direct Federal Transfers and Federal Contributions to State-Administered Programs	$241.8

[a] Transfer programs under which the federal government itself makes payments to individuals.

[b] Transfer programs administered by the state but funded jointly by the state and federal governments.

Source: Community Services Administration, *Geographic Distribution of Federal Funds in Alaska, 1980.*

$64 million to three state-operated welfare programs in 1980. Two of these state-operated programs which we have classified as "transfer" programs do not in fact involve direct payments to individuals. Under the Food Stamp program, qualified Alaskans can buy food stamps, which they in turn can use to buy groceries worth more than they paid for the stamps. Under the Medicaid program, the federal and state governments pay medical costs of poor Alaskans. Still, although these two programs do not put money directly into pockets of Alaskans, as do other transfer programs, we include them in Table 8 because the programs do increase purchasing power of recipients.

The state-operated program that received the most federal money in 1980 was the Food Stamp program, to which the federal government contributed nearly $26 million. The federal government also paid $22 million to the Medicaid program that year and roughly $16 million to the AFDC program. The State of Alaska pays half the costs of the Medicaid and AFDC programs, and only the administrative costs of the Food Stamp program.

Table 9 shows per capita federal transfer payments as a proportion of total per capita income in the various census divisions of Alaska in 1979, the most recent year for which we have such information. Federal transfer payments shown in column 2 of the table include both direct federal payments to individuals and federal contributions to state-operated programs. Column 3 shows combined federal and state per capita transfers in 1979. In addition to transfer programs that the state funds jointly with the federal government, Alaska funds several of its own transfer programs, including the pension program for retired state workers, longevity bonus payments to persons who have lived in Alaska for at least 25 years, general assistance payments to low-income persons, and supplements to the federal Supplemental Security Income program. A comparison of columns 2 and 3 of Table 9 shows us that federal transfers made up about 60 percent of all transfers statewide in 1979. In some census divisions federal transfers made up 75 percent of all transfers, and in no census division did federal transfers make up less than half of all transfers.

Federal transfers made up about 5 percent of the state's 1979 per capita income of $11,152. The importance of federal transfers to per capita income varied greatly around the state that year. In Anchorage, Fairbanks, and Juneau, which had per capita incomes higher than the state average, federal transfers made up less than 5 percent of per capita income. In areas of the state where per capita incomes were near the state average, federal transfers generally made up between 5 and 10 percent of per capita income in 1979.

It was in the census divisions with the lowest per capita incomes that federal transfers were most important in 1979. In these poorer areas of the state, federal transfers made up 20 to 30 percent of per capita income. The Wade Hampton census division in western Alaska had the state's lowest per capita income in 1979, and federal transfers made up 30 percent of its $2,730 per capita income. In three other census divisions with very low per capita incomes—Angoon in southeastern Alaska, Kobuk in western Alaska, and Kuskokwim in northwestern Alaska—federal transfers made up 20 percent of per capita income.

Federal Revenues From Alaska

In the previous section, we described federal spending in Alaska in 1980 and earlier years; in this section we examine the reverse: federal tax and other revenue collections from Alaska in 1980 and earlier.

Individual Alaskans paid about $1.3 billion in federal taxes and other levies in 1980, and overall economic activity in the state generated about $3.7 billion in federal revenues. The largest source of revenue generated by economic activity that year was the corporate income tax, which cost businesses operating in the state—primarily oil companies operating at Prudhoe Bay—nearly $2 billion. The largest source of revenues from individuals in 1980 was the personal income tax, which cost Alaskans $685 million that year.

Table 10 shows us that the federal government collected either $1.3 billion or $3.7 billion from Alaska in 1980, depending on which of two valid methods we use to calculate revenues.[7] These two methods of calculating revenues from Alaska essentially measure (1) federal taxes paid directly and indirectly by individual Alaskans and (2) federal taxes generated by economic activity in the state, including taxes paid both by Alaskans and by businesses operating in the state. Both these methods in some sense measure federal revenues "from Alaska." The first shows the federal tax burden on Alaskans themselves, while the second shows the importance of economic activity in Alaska—chiefly production of oil at Prudhoe Bay—to the federal treasury.

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[7] There is in fact a third measure of federal revenues from Alaska; the Internal Revenue Service annually reports on tax collections by state. These reports, however, show only where the taxes are collected—which would in many cases be different from where the tax liability was actually incurred. Therefore, we do not believe these IRS reports accurately show federal revenues generated in Alaska.

Table 9

Alaska Per Capita Income and Transfer Payments, by Census Division.* 1979
(in dollars)

Census Division	Per Capita Income	Federal per Capita Transfers	Total (Federal & State) per Capita Transfers	Federal Transfers as Percentage of per Capita Income
Aleutian Islands	$10,793	$1,038	$1,180	10%
Anchorage	12,200	456	769	4
Angoon	5,491	1,055	1,493	19
Barrow—North Slope	10,018	533	827	5
Bethel	5,772	779	1,122	13
Bristol Bay Borough	12,737	892	1,236	7
Bristol Bay	5,973	715	1,028	12
Cordova—McCarthy	11,042	521	875	5
Fairbanks	12,308	461	918	4
Haines	7,364	776	1,204	10
Juneau	14,605	611	1,148	4
Kenai—Cook Inlet	8,868	354	702	4
Ketchikan	14,003	722	1,191	5
Kobuk	4,760	923	1,383	19
Kodiak	9,615	471	747	5
Kuskokwim	3,929	929	1,309	24
Matanuska—Susitna	8,878	509	1,057	6
Nome	7,223	884	1,289	12
Outer Ketchikan	8,420	952	1,371	11
Prince of Wales	8,699	486	819	6
Seward	11,408	753	1,213	7
Sitka	14,064	669	979	5
Skagway—Yakutat	8,584	718	1,115	8
Southeast Fairbanks	7,134	439	838	6
Upper Yukon	11,091	1,434	2,048	13
Valdez—Chitina—Whittier	9,145	720	1,176	8
Wade Hampton	2,737	816	1,070	30
Wrangell—Petersburg	12,263	735	1,156	6
Yukon—Koyukuk	12,422	913	1,338	7
Alaska	11,152	540	903	5

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*See note b, Table 5.

Sources: Bureau of Economic Analysis, *Local Area Personal Income, 1974-1979*, Vol. 9, Far West Region, June 1981; Bureau of Economic Analysis, "Transfer Payments by Major Source," Regional Economic Information System computer printouts, April 1981.

The two yield such different results in Alaska today because the "economic activity" method includes very substantial federal taxes paid by oil companies operating at Prudhoe Bay. Until the mid-1970s, revenues measured under either method were similar because there was no large tax-generating economic activity in the state. Below we describe the two methods of revenue calculation in more detail.

Personal Incidence Method. Under this method of revenue calculation, only those federal taxes paid directly and indirectly by individual Alaskans are considered revenues from Alaska.

Alaskans—and other Americans—pay federal taxes directly and indirectly. Personal income taxes are direct taxes on individuals; what we pay is the amount we calculate on our federal tax returns. But federal business taxes also fall indirectly on individuals. The government collects various taxes directly from businesses, but businesses can shift the expense of taxes to: (1) their employees, by paying lower wages than they would have in the absence of federal taxes,[8] or (2) to their customers, by charging more for goods than they would have if there had been no federal tax, or (3) to their stockholders, by paying lower dividends.[9]

Economists disagree about precisely how businesses pass on taxes to individuals; some economists believe all individuals ultimately bear business taxes, while others believe that business taxes are borne mainly by certain groups of individuals. Economists do agree that businesses in fact pass on their tax costs somehow.

The amount of federal taxes that individuals pay directly and indirectly is known as the "personal incidence" of taxes. To estimate federal taxes paid directly and indirectly by Alaskans in 1980—column 1 of Table 10—we had to make a number of assumptions about who ultimately pays federal business taxes. We believe these assumptions are reasonable; however, we emphasize that the resulting figures could have been somewhat different had we used different assumptions.[10]

Economic Activity Method. Under this method of revenue calculation, all federal revenues generated by economic activity in the state are considered revenues from Alaska. We make no attempt here to measure how business taxes are passed on to individuals; we estimate taxes that the federal government collects directly from Alaskans, from others who work in the state but live elsewhere, and from businesses operating in the state.

By far the largest sources of federal revenues from Alaska in 1980 were federal taxes on Prudhoe Bay oil. To estimate these corporate revenues, we had to make some assumptions about the size of the corporate tax base in Alaska. Essentially, we used the State of Alaska's 1980 definition of the corporate tax base. The state government at that time taxed the gross value of Prudhoe Bay crude oil at the point of production.[11] For example, if Prudhoe Bay oil was worth $20 per barrel when it entered the trans-Alaska pipeline, the state government considered that $20 as gross income generated in Alaska.

This definition of the corporate tax base implicitly assumed that all the activity associated with Prudhoe Bay oil production occurs in Alaska. However, the companies producing that oil have operations in many states, and some of the activity that has made possible the discovery and development of the giant oil field in fact has occurred outside Alaska. For example, banks that loaned money to oil companies for petroleum exploration here were located outside the state, and some of the planning and engineering that goes into the continuing development of the Prudhoe Bay field takes place in oil company headquarters outside Alaska. Therefore, the oil companies have argued that part of the "economic activity" involved in producing Prudhoe Bay oil takes place outside the state, and thus part of their taxable income from that oil production is actually generated in other states. Partially in response to these arguments, the state government recently altered its definition of the corporate tax base here.[12]

Our findings, however, would not have been substantially different had we used a different definition of the corporate tax base; the overwhelming importance of petroleum revenues as a source of federal tax dollars here would be apparent in any case. We do want to emphasize, however, that our revenue estimates are more useful as indicators of the importance of Prudhoe Bay oil to federal tax coffers than as precise measures of federal petroleum revenues actually generated in Alaska.

Column 2 of Table 10 shows our estimates of various federal taxes generated by economic activity here in 1980.

Personal Incidence vs. Economic Activity. Column 1 of Table 10 shows us the federal tax burden

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[8] Businesses can also shift tax costs to individuals other than employees who are involved in production.

[9] Businesses could also pass federal taxes on to state and local governments, if they could offset an increase in federal taxes by a reduction in state and local taxes. However, the state and local governments would in turn recoup lost revenues by raising taxes for some group of citizens, and thus the incidence of the federal tax would again ultimately fall on taxpayers as individuals.

[10] In general, we used the same assumptions that are used by the Tax Foundation, Inc., a nonprofit organization that publishes information on federal revenues and other aspects of government finance. See Appendix E of *Federal Revenues and Spending in Alaska* for a discussion of these assumptions.

[11] In 1980, the State of Alaska defined gross taxable corporate income of petroleum companies operating in Alaska as the value of oil at the point of production. Adjustments we made to the state corporate tax base include allowances for accelerated depreciation, state oil and gas income tax payments, and others. See Appendix C of *Federal Revenues and Spending in Alaska* for a complete listing of these adjustments. The state also taxes income Alyeska Pipeline Service Company receives for transporting oil through the trans-Alaska pipeline, and other kinds of petroleum-related income.

(Footnote 11 continued)

[12] For state tax purposes, a number of state governments are party to the Multistate Tax Compact, which allocates "economic activity" of multi-state corporations among the various states in which they operate through a three-part formula. This formula allocates taxable income of a given corporation among various states based on proportions of total company payroll, property, and sales in each state. The State of Alaska now uses a modified allocation formula based on property, sales, and extraction to determine taxable petroleum income here.

Table 10

Federal Revenues from Alaska, FY 1980
(in millions of dollars)

	Personal Incidence[a]	Economic Activity[a]
Tax Revenues		
Individual Income	685.3	729.6
Social Security	345.3	471.6
Corporate Income	119.5	1,899.8
Excise[b]	42.7	12.7
Windfall Profits	8.3	461.6
Estate and Gift	2.3	2.3
Total Tax Revenues	$1,203.4	$3,577.6
Non-Tax Revenues		
Customs Duties	17.4	17.4
Alaska Railroad & U.S. Postal Service[c]	62.7	62.7
Resource Revenues[d]	40.5	40.5
Other Revenues	11.4	11.4
Total Non-Tax Revenues	132.0	132.0
Total Revenues	$1,335.4	$3,709.5

[a] See text for explanation of these two methods of calculating revenues from Alaska.

[b] Includes all excise taxes except the windfall profits tax on oil. Excise taxes are taxes on commodities, including gasoline, tobacco products, and alcoholic beverages.

[c] The federal government collected about $63 million in revenues from the Alaska Railroad and U.S. Postal Service here in 1980, but spent about $90 million to finance operations of those two entities that year.

[d] Revenues from sale of timber and other resources on federal land in Alaska; does not include revenues from Outer Continental Shelf lease sales off Alaska's coast.

on individual Alaskans in 1980, while column 2 shows dollars that flowed into the federal treasury as a result of economic activity in the state that year. The largest differences in revenues calculated under each method are in the corporate income tax category, so to illustrate the difference between the two methods, we will briefly describe how we arrived at the corporate income tax figures in each column of Table 10.

We estimate that individual Alaskans indirectly paid about $119 million in federal corporate income taxes in 1980. If all corporations nationwide in 1980 passed on all their corporate tax costs to individual Americans, then individual Alaskans—as consumers, employees of corporations, or stockholders—bore some portion of that national corporate tax bill.

Alaskans' share of that tax bill is based primarily on the state's population, personal income, and other factors reflecting the relative national importance of Alaskans as stockholders, consumers, and employees. The total corporate income tax the federal government collected in 1980 was $64.6 billion. Thus, we can see that Alaskans' indirect share was about 0.2 of 1 percent of the national corporate tax bill in 1980.

Under the "economic activity" method of calculating revenues, we estimate that the federal government took in about $1.9 billion from businesses operating in Alaska in 1980. Most of this corporate income tax was paid by companies engaged in extracting oil at Prudhoe Bay.

Thus, in summary, the $119 million shown in column 1 of Table 10 represents individual Alaskans' indirect share of corporate income taxes that businesses passed on to individuals nationwide, and the $1.9 billion in column 2 is the estimated amount the federal government collected from businesses as a result of operations in Alaska in 1980.

Table 10 shows that under the "personal incidence" method of calculating revenues from Alaska in 1980, the largest source of federal tax was the personal income tax, which netted the government about $685 million that year. Social Security taxes on wages cost Alaskans another $345 million. As we noted above, we estimate that Alaskans indirectly paid about $119 million in corporate taxes in 1980. Excise taxes—taxes on gasoline, alcohol, and other products—cost Alaskans about $43 million in 1980; Alaskans' share of the windfall profits tax on oil totalled about $2 million.

Tables 10 and 11 provide two breakdowns of federal revenues generated by economic activity in Alaska in 1980. Column 2 of Table 10 breaks out revenues by tax category, while Table 11 divides revenues into petroleum and nonpetroleum revenues.

As we noted above, the largest source of federal tax dollars from economic activity in Alaska in 1980 was the corporate income tax, which cost businesses operating in the state $1.9 billion. As Table 11 shows, the petroleum industry paid nearly all—$1.8 billion—of that corporate income tax, with other businesses paying about $110 million. The windfall profits tax on oil netted the federal government an additional $460 million here in 1980; this tax was in effect for only the last half of the year. Economic activity in the state generated about $730 million in personal income taxes in 1980.[13]

About 63 percent of the $3.6 billion in tax revenues generated by economic activity here in 1980 were petroleum revenues, with other kinds of taxes accounting for 37 percent of the total.

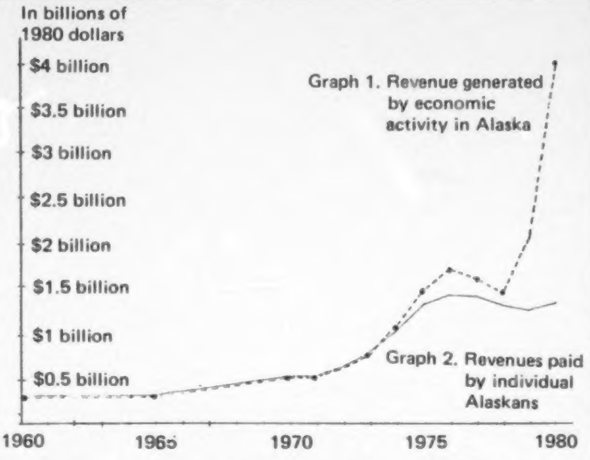

Figure 2. Federal Revenues from Alaska, 1960–1980
(in billions of 1980 dollars)

Table 11

Federal Petroleum and Non-Petroleum Tax Revenues* from Alaska, FY 1980

Type of Revenue	Amount (in millions of dollars)	Percentage of Total
Petroleum Revenues		
Corporate Income	$1,790.0	50%
Windfall Profits	461.6	13
Total Petroleum	$2,251.6	63%
Non-Petroleum Revenues		
Corporate Income	$ 109.7	3%
Other	1,216.3	34
Total Non-Petroleum	$1,326.0	37%
Total Tax Revenues	$3,577.6	100%

*Based on economic activity method of calculation.

Other kinds of revenues—non-tax revenues—totalled about $132 million here in 1980. These non-tax revenues make up a small portion of total revenues, and it is very difficult to calculate their relative levels using the "personal incidence" and "economic activity" methods. Therefore, we have assumed that levels of these revenues would be the same under either method of calculation. The largest source of revenues under this category in 1980 was the $63 million that the federal government collected from operation of the U.S. Postal Service and the Alaska Railroad. Sale of timber and other resources on federal lands in Alaska in 1980 brought the federal government about $40 million, and customs duties and other miscellaneous revenues netted about $30 million here that year.

Figure 2 shows real changes in federal revenue collections from Alaska between 1960 and 1980, as measured under both the personal incidence and economic activity methods of calculation. "Real" change is change minus the effects of inflation. To measure real change in federal revenues from Alaska, we converted all dollars to 1980 dollars.

The figure shows that from 1960 until the start of pipeline construction in 1974, revenues calculated under both methods were roughly equal; there was essentially no large tax-generating activity in the state. Then, in the mid-1970s, construction of the trans-Alaska pipeline began pushing revenues from economic activity higher than those from individual Alaskans. But the gap between the two did not widen sharply until oil production started at Prudhoe Bay in mid-1977 and the federal government began collecting substantial taxes on that production. By 1980, revenues from economic activity in the state were three times higher than those paid by individual Alaskans.

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[13] Our estimate of personal income taxes the federal government collected as a result of economic activity in the state is higher than our estimate of income taxes paid by individual Alaskans, because the "economic activity" figures also include income taxes paid by those who worked in the state in 1980 but lived elsewhere.

Effects of the Progressive Federal Income Tax

A hypothetical family of four in Anchorage would have paid about 16.5 percent of its income in federal personal income taxes in 1980, while the same family with equal buying power in the average U.S. city would have paid about 13 percent. This disproportionate federal tax burden on Alaskans is a result of the progressive federal income tax system, which taxes Alaskans' nominally higher incomes at a higher rate, without regard for the higher living costs that accompany those incomes. This progressive federal tax not only drives up living costs of individual Alaskans but also affects the entire state economy by increasing wages and thus the costs of doing business.

In discussing revenues from Alaska in 1980, we looked at the incidence of various federal taxes on individual Alaskans; if we calculated federal taxes paid by residents of other states, we would generally see little difference among these states in the incidence of such taxes. Most federal taxes are shared equitably by all Americans, whether they live in Alaska, Kansas, or New Hampshire. The *exception* to this rule is the personal income tax, which falls heavier on Alaskans than on other Americans.

Alaska has both the highest living costs and highest per capita incomes in the nation. Living costs are high for a number of reasons related to the state's isolation, vast size, harsh climate, and small population. As a result of these higher living costs, wages in Alaska are also higher: we need higher incomes to pay higher prices.

Under the federal income tax system, individuals pay ever-larger proportions of their incomes in taxes as those incomes increase. For example, an individual who earns $30,000 per year pays a larger percentage of that income in tax than does the individual who earns $20,000 per year. Alaskans are hard hit by this progressive tax structure, because the system fails to take into account the higher living costs that accompany the state's high incomes. Table 12 provides a hypothetical example of how this progressive tax system costs Alaskans proportionately more than other Americans, and further increases Alaska's already high living costs.

The table shows incomes that the federal Bureau of Labor Statistics estimated would be required for a hypothetical family of four in Anchorage and in the average U.S. city to maintain the same moderate standard of living in 1980. The bureau estimated the Anchorage family would need $29,700 to buy goods and services and pay taxes in 1980; the same family in the Lower 48 could buy the same standard of living and pay its tax bills with $23,100. Overall budget costs, then, were 28 percent higher in Anchorage.

The table breaks out federal tax costs and other living costs from the overall budget figures. Costs of food, housing, and other items—excluding federal taxes—were 23 percent higher in Anchorage than in the average U.S. city. Federal taxes, however, were a dramatic 60 percent higher for the Anchorage family

Table 12

Effects of Progressive Federal Income Tax on Alaska Cost of Living, 1980

	Anchorage	U.S. Urban Average	Ratio
Total budget costs, family of four at moderate standard of living[a]	$29,682	$23,134	1.28
Budget costs, excluding federal income taxes	24,833	20,119	1.23
Federal income taxes[b]	4,849	3,015	1.60
Taxes as percentage of total budget costs	16.3%	13.0%	
Anchorage taxes at U.S. urban average rate	$3,859		
Excess Anchorage Taxes	$ 990[c]		

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[a] Budget figures from the U.S. Bureau of Labor Statistics, *Autumn 1980 Family Budgets and Comparative Indexes for Selected Urban Areas.*

[b] Calculated on the basis of a joint return with four exemptions, using the standard deduction.

[c] $4,849 (Anchorage taxes at 16.3% rate) minus $3,859 (Anchorage taxes at 13% rate).

Note: The progressive federal income tax in fact increases overall living costs of this hypothetical family by more than simply the $990 in excess taxes shown in this table. As discussed in the text, the progressive federal tax system has driven up wages in Alaska, and as wages increase so do costs of goods and services. Thus, if the excess federal tax burden on Alaskans were eliminated, we would anticipate that wages and thus also overall living costs would decline somewhat.

than for the average U.S. family—because the Anchorage family's nominally higher income was taxed at a higher rate, even though the family in both locations had equal buying power.

The hypothetical Anchorage family paid $4,850 in federal income taxes in 1980, or 16.3 percent of total budget costs. The same family at the same standard of living in the average U.S. city paid $3,015, or 13 percent of total budget costs.

We can readily see the effect that this progressive tax system has on Alaska's cost of living: while all budget costs aside from federal taxes were 23 percent higher in Anchorage, costs of federal taxes combined with all other budget items were 28 percent higher than U.S. average costs. If, on the other hand, the family with equivalent buying power in Anchorage and in the average U.S. city had been taxed at the same rate of 13 percent, the Anchorage family's tax bill would have been about $3,860, or $1,000 less, in 1980. Looked at in a slightly different way, the excess tax burden on the Anchorage family—that portion of federal taxes the Anchorage family paid solely because it had a higher nominal income—was about $1,000 in 1980. If this excess federal tax had been eliminated, the Anchorage family's overall costs of living would also have been reduced.

This progressive federal income tax, however, has much broader effects than those on individual Alaskans. We believe that wages in Alaska have been driven higher to compensate for these high federal taxes—that part of the difference between Alaskan wages and average U.S. wages is due to the federal tax system. These increased wages have further increased the already high costs of doing business in Alaska. These high costs in turn have discouraged business activity, and thus the whole state economy has suffered as a result of the progressive federal income tax system. Stated another way, if the excess federal tax on Alaskans were eliminated, the entire state economy would benefit through reduced costs.

Tax Costs of Federal Grants

In every year since becoming a state, Alaska has received more in federal grants than it paid into the national grant budget; in 1980, Alaskans received roughly two grant dollars for every dollar they paid into the federal grant program.

Straightforward comparisons of overall federal spending and taxation in Alaska do not tell us how many dollars of federal benefits Alaskans received in exchange for the dollars they paid in taxes. As we noted earlier, most of the money the federal government spends in Alaska—and in all other states—in any given year is for federal operations. In 1980, about 80 percent of the money the federal government spent nationwide was for operations and about 20 percent for grants. Federal operational spending benefits all Americans, regardless of where the money is spent. An obvious example of federal operational spending in Alaska that benefits all Americans is defense spending. These expenses do, of course, also benefit Alaskans by bringing money into the economy and creating jobs, as we will discuss in detail in the next section. Still, it is not valid to say that in 1980 Alaskans received $2.2 billion federal dollars in exchange for the $1.2 billion tax dollars that individual Alaskans paid.

A much better measure of dollars paid versus dollars received is the federal grant dollars we receive as compared with tax dollars we contribute to the national grant program. Unlike operational expenses, federal grants do more narrowly benefit residents of the geographic region in which the dollars are spent.

The Tax Foundation has determined that each state, based on population, income, and other factors, pays some portion of the overall federal grant costs. Table 13 shows how much Alaskans and residents of other states paid into the federal grants program in exchange for each grant dollar they received in 1980. These contributions to the grants program are determined under the "personal incidence" method of measuring tax collections. The table shows that Alaska in 1980 was among the states paying the least for every grant dollar received. Alaska paid about 52 cents for each grant dollar received. Washington, D.C. paid proportionately the least into the federal grants program, contributing only 32 cents for each grant dollar spent in the nation's capital.

Residents of Texas and Connecticut, on the other hand, paid more into the grants program than they received. Texas, for example, paid $1.40 into the grant program in exchange for every $1.00 it received in 1980.

Table 14 shows how much Alaskans have paid into the grants program in exchange for grants received since 1960. When Alaska became a state, Alaskans paid only 16 cents into the grants program for every grant dollar the state received. The relative amount paid by Alaskans increased each year until 1979, when Alaskans paid 61 cents for every federal grant dollar received; this proportion fell to 52 cents for every dollar in 1980.

Thus, in every year since Alaska joined the union, Alaskans have paid less into the grants program than they received in federal grants. In 1980,

Table 13

States with Highest and Lowest Tax Burdens for Federal Grants Received, FY 1980

States	Amount Paid into Grant Program for Each Grant Dollar Received
Highest	
Texas	$1.40
Connecticut	1.35
Indiana	1.34
Ohio	1.27
Florida	1.23
Lowest	
Mississippi	.53
Alaska	.52
South Dakota	.48
Vermont	.45
Washington, D.C.	.32

Note: Approximately 20 percent of the federal budget in fiscal 1980 was spent for grant programs nationwide. The Tax Foundation has determined that each state, on the basis of population and other factors, pays some portion of the costs of federal grant programs. This table shows how much Alaska and other states paid into the grants program for each dollar of grants received; for example, Alaska paid 52 cents into the grants program for each $1 it received in grants, while Texas paid $1.40 for each $1 of grant money it received in 1980. These relative tax burdens are calculated on the basis of personal incidence of taxes on residents of each state.

Source: Tax Foundation, Inc.

Alaskans essentially received twice as much in federal grants as they paid into the grants program.

Generally, states with large land areas and small populations tend to receive higher than average grants. In Alaska, other factors have also historically increased the state's share of grant money. Much of the federal grant money that the state and local governments here have received over the years has been for development of infrastructure (roads and harbors, for example) that did not exist when Alaska became a state. Also, the federal government owns much of the land in Alaska, and this land as well as federal facilities are exempt from local taxation; some federal grants are made to compensate local jurisdictions for foregone taxes.

This comparison of tax dollars that Alaskans pay into the federal grant program and grant dollars the state receives is one measure of how the federal government benefits and costs Alaskans. As we discuss in the Conclusions section, there are much broader benefits and costs that cannot be measured in such a dollar comparison.

Employment Effects of Federal Spending and Revenue Collection

Here we look first at numbers of state and local government jobs supported by federal grants between 1965 and 1979, and at how those jobs as a proportion of total state and local government jobs changed during that period. We then discuss overall numbers of jobs created and lost in Alaska in 1980 as a result of federal spending and taxation.

Federal grants supported an estimated 5,500

Table 14

Alaska's Tax Burden for Federal Grants Received, FY 1960-1980

Fiscal Year	Amount Paid into Grant Program for Each Grant Dollar Received
1980	$0.52
1979	.61
1978	.64
1977	.61
1976	.55
1975	.42
1974	.36
1973	.38
1972	.34
1971	.33
1970	.33
1969	.28
1968	.25
1967	.21
1966	.12
1965	.15
1964	.11
1963	.20
1962	.19
1961	.17
1960	.16

Note: See note on Table 13 for explanation of how these figures are calculated.

Source: Tax Foundation, Inc.

state and local government jobs in Alaska in 1979, or about 15 percent of all state and local government jobs. As recently as 1965, federal grants supported nearly 40 percent of all state and local government jobs. Overall federal spending directly and indirectly created 71,700 jobs in Alaska in 1980, while federal taxation indirectly cost the state about 23,000 jobs. Thus, on balance, federal spending created 48,700 more jobs here in 1980 than federal taxation cost the state.

State and Local Government Jobs Funded by Federal Grants

Table 15 shows federal grants to the state and local governments in Alaska between 1965 and 1979, and numbers of jobs that this grant money supported. The first five columns of the table show the size of the state general fund, federal grants to that fund, federal grants as a proportion of the general fund, total state government jobs, and numbers of state government jobs supported by federal grants.

Between 1965 and 1979, state general fund expenditures (excluding transfers to local governments) grew from $131 million to $866 million—an increase of more than 500 percent. During the same period, federal grants to the state general fund increased about 160 percent, growing from $84 million to $220 million. Thus, while both the size of the general fund and the level of federal grants to that fund increased between 1965 and 1979, the general fund grew much faster. As a result, federal grants as a proportion of the state general fund dropped sharply during those 15 years, decreasing from about 63 percent of all general fund monies in 1965 to 25 percent in 1979.

Numbers of state jobs supported by federal grants declined slightly between 1965 and 1979, dropping from about 4,400 in 1965 to 3,800 in 1979.[14] Several factors probably contributed to this relatively small change in numbers of state jobs supported by federal grants. First, although nominal federal grant dollars contributed to the general fund increased between 1965 and 1979, consumer prices more than doubled during the 15-year period. Thus, much of the apparent increase in grant dollars simply resulted from rising prices. Also, there was a real increase—an increase beyond that brought on by inflation—in government wages between 1965 and 1979.

The last five columns of Table 15 show local government expenditures in Alaska between 1965 and 1979, and federal grants as a proportion of those local expenditures. During that period, local government spending in Alaska increased more than tenfold, jumping from $61 million to $806 million. Federal grants to local government also increased sharply during those years, particularly the mid- and late 1970s. Federal grants to local governments increased from a modest $3 million in 1965 to $67 million in 1979. Federal grants as a proportion of all local expenditures increased from about 5 to 8 percent over that period, and numbers of local government jobs supported by federal grants increased from about 300 to 1,700.

Looking at combined numbers of state and local government jobs supported by federal grants—shown in the last column of Table 15—we see that in 1965 federal grants supported about 4,700 state and local government jobs, or nearly 40 percent of the total 12,200 state and local jobs. By 1979, federal grants supported about 5,500 state and local government jobs, or about 15 percent of the total 36,600 such jobs.

Overall, the importance of federal grants to the state general fund declined sharply between 1965 and 1979, while federal grants as a proportion of local government revenues increased slightly during that same period. However, in 1979 federal grants still made up a much larger proportion of state than local expenditures, accounting for 25 percent of the state general fund and only 8 percent of local government revenues. Likewise, numbers of state jobs supported by federal grants declined slightly between 1965 and 1979, while numbers of local jobs supported by federal grants increased. By 1979, however, federal grants still supported twice as many state as local government jobs.

Jobs Created and Lost Through Federal Spending and Taxation

Federal spending and taxation here affect Alaska's economy in a number of ways. In this section, we measure those spending and taxation effects through numbers of jobs created or lost as a result of federal activities here in 1980.

It is difficult to completely analyze the overall impact on the state's economy that would occur should the federal government suddenly cease to spend or collect money here. The federal government is such a large part of the state's economy that in the absence of federal activity the whole structure of the economy would change. The form such a massive change would take is impossible to predict; for example, to what extent would the state and local

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[14] These are estimates of numbers of state and local government jobs supported by federal grants—derived by assuming that $1.00 of federal grant money supported state and local employment to the same extent as would $1.00 from any other source.

Table 15

Estimated Alaska State and Local Government Jobs Supported by Federal Grants, 1965–1979

STATE GOVERNMENT

Year	State General Fund Expenditures[a] (in million $)	Federal Grants to State Gen. Fund[b] (in million $)	Federal Grants as/% of State Expenditures	Total State Govt. Jobs[c] (in thousands)	State Jobs Supported by Federal Grants[d] (in thousands)
1979	$866	$220	25%	15.0	3.8
1978	769	233	30	14.3	4.3
1977	734	230	31	13.9	4.3
1976	640	241	38	14.1	5.4
1975	462	186	40	15.5	6.2
1974	391	141	36	14.2	5.1
1973	366	146	40	13.8	5.5
1972	327	124	38	13.3	5.1
1971	301	111	37	11.7	4.3
1970	197	77	39	10.4	4.1
1969	164	73	45	9.3	4.2
1968	149	62	42	8.7	3.7
1967	156	79	51	8.1	4.1
1966	127	69	74	7.7	4.2
1965	131	83	63	7.0	4.4

LOCAL GOVERNMENT

Year	Local Government Expenditures[e] (in million $)	Federal Grants to Local Government[e] (in million $)	Federal Grants as a Percentage of Local Expenditures	Total Local Government Jobs[c] (in thousands)	Local Jobs Supported by Federal Grants[d] (in thousands)	State & Local Govt. Jobs Supported by Federal Grants (in thousands)
1979	$806	$67	8%	21.6	1.7	5.5
1978	596	51	9	19.8	1.8	6.1
1977	539	38	7	17.2	1.2	5.5
1976	426	27	6	15.2	.9	7.1
1975	360	24	7	13.3	.9	7.1
1974	324	32	10	11.6	1.2	6.3
1973	286	15.	5	10.6	.5	6.0
1972	225	6	3	10.0	.3	5.4
1971	178	9	5	9.0	.5	4.8
1970	117	5	4	8.1	.3	4.4
1969	104	5	5	7.5	.4	4.6
1968	89	4	4	6.6	.3	4.0
1967	90	4	4	6.3	.3	4.4
1966	83	5	6	5.7	.3	4.5
1965	61	3	5	5.2	.3	4.7

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[a] Excluding state General Fund transfers to local governments; based on Alaska Department of Administration, *Annual Financial Reports*, 1965-1979.

[b] U.S. Dept. of Commerce, *State Government Finances*, annual.

[c] Alaska Department of Labor, *Statistical Quarterly.*

[d] Federal grants as a percentage of state General Fund expenditures (excluding transfers to local government), multiplied by total state government employment.

[e] U.S. Department of Commerce, *Governmental Finances*, annual.

governments and private industries take over functions previously carried out by the federal government? What would be Alaska's relationship to the U.S. economy in such an instance? Because of these difficulties in predicting and analyzing structural change here in the absence of the federal government, we made simplifying assumptions in order to estimate effects of federal activities on Alaska's economy. Our primary assumption is that no entity would replace *any* of the spending or taxation activities of the federal government, should the federal government itself cease such activities.[15]

Federal spending in Alaska, by introducing money into the economy, creates jobs both directly and indirectly. Table 16 shows how the various categories of federal spending in Alaska created jobs in 1980. This federal spending included payrolls for federal civilian and military employees, grants to state and local governments and private entities, transfer payments to individuals, and loan guarantees and subsidies.[16]

Military and civilian payrolls of about $723 million paid for 41,200 federal jobs here in 1980. We estimate that these direct federal jobs in turn generated about 17,000 support jobs in private industry. To arrive at this estimate of private jobs indirectly created by federal jobs, we assumed that in general two federal jobs would create one private support job. However, about 2,400 federal jobs in 1980 were in military commissaries and post exchanges, which provide services that would otherwise be provided by private industry. Thus, to calculate numbers of support jobs created by federal jobs, we first subtracted commissary and post exchange jobs, which substitute for, rather than generate, private support jobs.

Another category of federal spending that directly and indirectly created jobs here in 1980 was federal grant spending. We estimate (as noted in the discussion of Table 15) that grants to state and local governments directly supported 5,500 state and local government jobs here in 1980 and that these jobs, as well as grant money that went to private organizations, generated in turn about 3,000 private support jobs.

Federal transfer payments to individuals indirectly create jobs, because individuals spend transfer money for goods and services. We estimate that in 1980 federal transfer payments (including both those the federal government made directly to individuals and federal contributions to state-operated transfer programs) indirectly created about 4,000 jobs in private industry here. We used a computer simulation model of Alaska's economy to arrive at this estimate.

Finally, loan guarantees and subsidies that the federal government provides also indirectly generate jobs in Alaska. Such guarantees and subsidies make loan activities here more profitable than they would otherwise be, thus stimulating economic activity—and increased economic activity creates jobs. We estimate that federal loan guarantees and subsidies indirectly generated about 1,000 jobs in private industry in Alaska in 1980.[17]

Overall then, federal spending in Alaska in 1980 directly and indirectly created 71,700 jobs here.

Just as federal spending creates jobs here by introducing money into the economy, federal taxation and other kinds of revenue collection cost the state jobs. Unlike federal spending, which creates jobs both directly and indirectly, federal collections do not directly eliminate existing jobs but cost the state jobs only indirectly, by removing from the economy money that might otherwise have been used to create additional jobs.

In 1980, federal revenue collections decreased Alaskans' disposable incomes by about $1.3 billion. This $1.3 billion was the amount Alaskans directly and indirectly paid in federal revenues in 1980.[18] We estimate that this $1.3 billion taken out of the economy in 1980 indirectly cost the state 23,000 jobs that could otherwise have been created.[19]

Federal revenue collections in fact cost the state more jobs in 1980 than just the 23,000 which we estimate were lost through revenue collections from individual Alaskans. As we discussed in looking at the effects of the progressive federal tax system on Alaskans, federal taxes drive up the costs of doing business here. Increased costs discourage business activity. In the absence of federal taxes, costs of doing business would be reduced, which would stimulate economic activity and increase the number of jobs. Measuring these effects of federal taxes on over-

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[15] See *Federal Revenues and Spending in Alaska*, Chapter 4, for a more detailed discussion of these assumptions.

[16] We did not include federal loan guarantees and subsidies in our earlier discussion of federal spending in Alaska because such spending is an indirect rather than a direct federal expenditure. In this section, however, we do include employment effects of federal loan guarantees and subsidies in our analysis, because these subsidies and guarantees stimulate economic activity and thus help create jobs. We estimate that federal loan guarantees and subsidies totalled about $212 million here in 1980.

[17] Authors' estimate.

[18] We use these revenues from individual Alaskans, rather than revenues generated by economic activity, as a basis for this discussion because collections from individual Alaskans represent money actually taken out of the state economy.

[19] We used a computer simulation model of the state's economy to arrive at this estimate.

Table 16

Jobs Created by Federal Spending in Alaska, 1980

Categories of Spending	Amount (in million $)	Jobs Created (in thousands) Federal Govt.[a]	State/Local Govt.	Private Industry
Payroll				
Civilian Payroll	$422	17.9		
Military Payroll	301	23.3		
Total Payroll	$723	41.2		17.0[b]
Grants (excluding transfers)[c]				
State Government Local Government Other	$410		5.5[d]	3.0
Transfers[e]	$242			4[f]
Loan Programs	$212			1[g]
TOTAL		41.2	5.5	25.0
		71.7		

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[a] These are 1979 federal employment figures; the numbers of federal jobs were essentially the same in 1980.

[b] Federal jobs, excluding 2.4 thousand commissary and post exchange jobs, multiplied by 0.5.

[c] Total grant payments, excluding federal grants to state-operated transfer programs.

[d] See Table 15. We have here used estimated numbers of state and local government jobs funded by federal grants in 1979; we believe these numbers were essentially the same in 1980.

[e] Includes direct federal transfers and federal grants to state-operated transfer programs.

[f] Indirect employment generated by transfer payments based upon simulations of the Man in the Arctic Program (MAP) computer model.

[g] Author's estimate.

all business activity in the state would require an industry-by-industry analysis of the effects of taxes—an analysis far beyond the scope of this work.

Table 17 shows the net employment effects of federal spending and taxation here in 1980. Federal spending directly and indirectly created 71,700 jobs, while revenue collections indirectly cost the state 23,000 jobs. On balance, then, federal spending created 48,700 more jobs here in 1980 than federal collections cost the state.

CONCLUSIONS

The Fiscal Relationship

Our analysis of the flow of federal money into and out of Alaska shows these significant points about the fiscal relationship between Alaska and the federal government:

- The federal government continues to be very important to Alaska's economy. In 1980, when development of petroleum resources on the North Slope was fostering substantial economic growth in the state, the federal government still supplied one in five jobs here—three times the national average. These direct federal jobs, and federal transfers, loan guarantees, and grants indirectly generated thousands more jobs in state and local government and private industry.

Federal taxation does cost the state jobs by taking money out of the economy, but we estimate that in 1980 federal spending here created twice as many jobs as federal taxation cost the state.

The importance of jobs created by federal spending lies not only in their numbers, but also in their stability; the federal government is the largest and most stable source of jobs in an economy that is otherwise very much subject to the vicissitudes of natural resource development.

- The federal personal income tax system discourages business development in Alaska. Because the progressive federal tax system takes no account of the higher living costs that accompany Alaskans' nominally high incomes, Alaskans have historically paid larger proportions of their incomes in taxes than other Americans with the same effective incomes. We

Table 17

Net Employment Effects of Federal Spending and Taxation in Alaska, 1980

Jobs Created by Federal Spending	(in thousands)
Federal Jobs	+41.2
Other Jobs	+30.5
Total	+71.7
Jobs Lost through Federal Taxation*	
Total	−23.0
Net Effects, Federal Spending & Taxation	+48.7 jobs

*Based on the $1.3 billion in federal revenues paid by individual Alaskans in 1980. In arriving at this figure, we assumed that federal tax policy does not differentially affect the profitability of Alaskan businesses; see text for further discussion of this point.

believe that to compensate for this high tax burden, wages in Alaska have been driven up. However, higher wages further increase the already high costs of doing business in Alaska, and thus discourage business development. Therefore, the effects of the federal tax system fall not so much on individuals—whose wages have been increased to compensate for the taxes—but on the entire state economy by discouraging business growth.

- State and local governments in Alaska receive more federal grant money than the U.S. average. The Tax Foundation, Inc. estimates that in 1980 Alaska received about two grant dollars for every one dollar Alaskans paid into the national grant program in taxes.

Alaska has received relatively high federal grants since it became a state. In general, states with large land areas and small populations tend to receive higher than average grants, and in Alaska other factors tend to increase grants to the state and local governments. Over the years, much grant money has been used to aid the state and local governments in developing the economic infrastructures (roads, harbors, and airports, for example) that did not exist when Alaska became a state. Also, the federal government owns much of the land in Alaska, and this land as well as federal facilities are exempt from state and local taxation. Thus, some federal grants are to compensate local jurisdictions for taxes lost because of federal land ownership. Finally, the federal government has a number of grant programs specifically for Alaska Natives, and these programs also increase Alaska's share of grant money.

- Prudhoe Bay oil production makes a substantial contribution to the federal treasury. We estimated that in 1980 the federal government collected about $2 billion in federal corporate income and windfall profits taxes from North Slope petroleum operations.

It is tempting to try to go beyond the above conclusions and compare the $2.2 billion in overall federal spending here in 1980 with the $3.7 billion in revenues collected from individuals and businesses as a measure of what Alaska receives from and contributes to the federal treasury. Such a comparison makes it appear that Alaska contributed $2 to the federal treasury for every $1 it received that year.

However, such a straightforward dollar comparison is misleading because it implies: (1) that all federal spending here is solely for the benefit of Alaskans; (2) that taxes paid by multinational corporations operating in Alaska are somehow costs borne only by Alaskans; and (3) that all the costs and benefits in the complex relationship between Alaska and the federal government can be measured in an analysis of dollars spent and taxes generated within the state. We discuss each of these three points briefly below:

- All federal spending here is not solely for the benefit of Alaskans. In fact, most of the money that the federal government spends here is for operations that are intended to benefit all Americans rather than just Alaskans. An obvious example is defense spending. Defense spending in Alaska is relatively high, and Alaskans benefit from such spending because it creates jobs here—but in a much broader sense, Americans as a whole benefit from maintenance of the national defense system. Conversely, much federal spending that takes place outside the state benefits Alaskans as well as the residents of the state wherein the spending occurs. Again, we can cite defense spending as an example of such spending.

- Taxes paid by multinational oil companies operating in Alaska are ultimately borne by residents of all states. Federal revenues from Prudhoe Bay oil can be considered revenues from Alaska in the sense that they are generated by oil production here, and our analysis makes it apparent that the Prudhoe Bay field is an important federal as well as state tax base. But to use taxes paid by multinational corporations in a comparison of what Alaska receives from and contributes to the federal treasury implies that such taxes are somehow costs only to Alaskans. In fact, taxes paid by multinational corporations operating here ultimately cost residents of all states, because federal business taxes are passed on to individuals nationwide.

- Our analysis of dollars spent and taxes generated here does not measure all the costs and benefits in the complex relationship between Alaska and the federal government, but rather the limited kinds of costs and benefits we have already discussed—primarily jobs created and lost as a result of federal spending and taxation. There are many kinds of costs and benefits beyond these that cannot readily be assigned a dollar value. What, for example, is the dollar benefit to Alaskans of the protection they receive from the national defense system? Or the dollar benefit to the federal government of Alaska's strategic military location?

In summary, then, our analysis of the flow of federal money into and out of Alaska is most useful as an indication of the many ways in which the federal government influences the state's economy.

Future Changes

We recognize that both federal spending and collection here in 1982 will be different than in 1980; we do not know precisely what these changes will be, but we can talk in general about likely changes.

Changes in Federal Spending in 1982

The federal government is currently attempting to reduce spending nationwide by reducing costs of or eliminating some programs and turning other programs over to state and local governments. In Alaska, the federal government has already cut, or has plans to cut, a number of grant programs that were among the largest in the state in 1980. These include the Highway Planning and Construction program, the School Aid to Federally Affected Areas program, the Comprehensive Employment and Training (CETA) program, and the Food Stamp and Medicaid programs. Also, the Interior Department has announced plans to turn over thirty-seven Bureau of Indian Affairs's schools to the state government by the end of 1982 and is reducing or eliminating some programs for Alaska Natives, most notably the Indian General Assistance program. The federal government also hopes to turn over operation of the Alaska Railroad to the state government.

What the overall effect of these cost-cutting moves on federal spending in Alaska will be is uncertain; the largest single federal spender in Alaska is the Department of Defense, and the Reagan Administration plans to increase defense spending nationwide. Thus, overall federal spending may change little in 1982 while the composition of that spending shifts.

Changes in Federal Revenues from Alaska

A number of factors will change federal collections from individuals and from economic activity in the state this year.

Revenues from Economic Activity. Revenues from economic activity in the state in 1981 were substantially higher than those we estimated for 1980, for two reasons: the price of oil continued to rise in 1981, and the windfall profits tax, which was in effect only half of 1980, was collected throughout 1981. However, we anticipate that federal revenues from economic activity in Alaska in 1982 will be significantly below those of 1981 because: (1) changes in federal tax law appear to have reduced corporate income taxes, which were the federal government's largest sources of revenues here in 1980 and 1981, and (2) the price of oil is falling in 1982. How far the price will drop is uncertain, but the price drop to date will certainly reduce federal revenues from Prudhoe Bay oil.

Revenues from Individual Alaskans. Federal personal income tax collections from Alaskans will probably increase somewhat in 1982, but at a slower rate than in the past. Recent federal tax law changes reduced the rate of personal income taxes but also increased the rate of Social Security taxes. These tax changes will tend to counterbalance each other. At the same time, personal incomes of Alaskans will increase somewhat in 1982; the combined effects of tax law changes and increasing personal income will probably tend to increase personal income tax collection from Alaskans.

Beyond 1982, the relative importance of the federal government to Alaska's economy is likely to continue to decline somewhat, as it has done over the past two decades. How large this decline will be will depend on: how much other elements of the economy grow and how much the federal government reduces—or at least reduces the rate of increase of—federal spending here.

Future growth in Alaska's economy, apart from federal activities, is closely tied to petroleum development. The price of oil was dropping in early 1982, as more oil was produced than demanded worldwide. Analysts predicted that this price drop would decrease state government revenues in the upcoming fiscal year by half or more, and the implications of sharply reduced state revenues reverberated throughout the economy. In the long run, however, the price of oil is likely to once again increase, but how soon and how much is uncertain. Because costs of extracting Alaskan oil are high, reduced oil prices could not only reduce state revenues from current production at Prudhoe Bay, but also curtail petroleum exploration and development here—and thus curtail state economic growth.

It seems likely that aside from cuts that the federal government is making in specific programs, many kinds of federal spending in Alaska will at least hold steady or increase somewhat in the coming years. Therefore, the factor most affecting the relative importance of the federal government to Alaska's economy in the upcoming years will be growth in other parts of the economy—which will be determined by petroleum development. Given the uncertainties of such petroleum development, the federal government will continue to be a crucial source of jobs and stability in Alaska's economy for the foreseeable future.

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THE DEMAND FOR LABOR IN ALASKA

INTRODUCTION

No one demands labor for its own intrinsic value. Rather, the demand for labor is derived from its ability to produce goods or services that ultimately satisfy the purchasing power and desires of consumers. Sometimes this link is quite direct; retail trade establishments hire workers based on their level of consumer sales. Other times, the link can be indirect and not at all obvious. For example, the demand for labor in Alaska's resource sectors (such as forestry, fisheries, or energy) is determined by consumers throughout the United States, and indeed, the world. In all cases, however, the reason for labor being demanded is its ability to produce products which ultimately satisfy the desires and purchasing power of consumers. It is in this sense that economists refer to the demand for labor as a "derived demand."

The demand for labor in some Alaska industries is derived primarily from national or international consumer markets. These are called the state's "basic" industries. Other industries derive their demand for labor primarily from consumer markets within the state, and they are called the state's "nonbasic" industries. When Japanese housewives a few years ago organized a consumer boycott to protest the high price of herring roe, the demand for labor in one of Alaska's basic industries (fish products) declined. The demand for labor in the state's nonbasic industries on the other hand derives from the purchasing power and desires of Alaska residents.[1]

Employers, however, do not really demand labor in general. They demand workers with specific skills, experience levels, or other types of occupational qualifications. Employers who need carpenters will not hire persons who have worked only as retail clerks, and recent high school graduates are not substitutes for workers with long years of experience in any field. Instead of a general demand for labor, what really exists are many different demands for many different types of labor. This is the concept of "occupational labor demand," and it is critically important in understanding how Alaska's labor markets operate. It can result in a situation where employers are demanding types of labor which they cannot find while, at the same time, unemployed persons are looking for work and yet cannot get hired. When such a mismatch occurs between the skills that employers want to hire and those that state residents possess, we have a situation known as "structural unemployment." This situation occurs when the structure of labor demand does not fit the structure of occupational skills embodied in (or supplied by) the state's working age population.

While the patterns of industrial and occupational demand are central to understanding how the demand for labor has changed in Alaska, we need to mention several other qualifications. One of these is that the market demand for labor will be affected by the size of the firm doing the hiring. Larger firms will often satisfy their requirements for skilled labor by internal promotion. Only their lower-skilled, entry-level posi-

This *Review* examines the nature of Alaska's changing labor demand both by major industrial sector and by occupational sector. It also discusses changes in Alaska's labor demand that may be expected to occur over the next decade.

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[1] For a more complete discussion of the basic/nonbasic concept, see: Theodore Lane, Eric Swanson, and Marc Reeder, *A Forecast of Industrial and Occupational Employment in Alaska* (ISER, 1974), pp. 169-172.

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FEATURE

Theodore Lane — The Demand for Labor in Alaska

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tion may be filled by outside hiring. A firm which is expanding its operations in Alaska, for example, may require an additional supervisor of computer systems. It may satisfy its requirements by promoting a systems analyst whose job will be filled by the promotion of a senior programmer; the senior programmer's vacancy will be filled by the promotion of a junior programmer. The firm will then go into the general labor market and hire a junior programmer. This process of promotion from within means that a firm's labor requirements may be quite different than its demands for labor in the general market. Thus, the distinction between labor requirements and labor demand could become significant, particularly as large firms become a more important component of Alaska's economy.

A second qualification is that a firm's demand for labor will result in different hiring practices, depending upon the immediacy of its production requirements. For example, in the processing of fish products, employers have little ability to schedule production. When the fish arrive at the dock, they have to be unloaded and processed immediately to prevent spoilage. Furthermore, the entire fish processing industry can only operate when the fish are running and it is legal to harvest them. When this type of situation exists, the timing of the demand for labor will be determined by the availability of the resource, although the magnitude of demand will still be derived from the purchasing power and desires of the ultimate consumers.

The demand for labor in such resource-based industries will be highly seasonal regardless of its magnitude (i.e., the number of persons hired) in any particular year. However, in these types of seasonal industries, part of the magnitude of demand will result in adjustments in average hours worked per employee rather than the number of employees hired. Using the fish processing industry again as an example, if the run is larger than anticipated, fish processing plants will not have the time to recruit additional workers. The response will then be to employ the existing work force for longer hours each day. In a similar manner, very short-term increases in labor demand will often be satisfied by employers offering their workers overtime hours. Where a job requires on-site training and the increased labor demand is expected to be of short duration, employers will find it cheaper to pay overtime wages than to train additional workers.

Finally, the demand for labor is affected in the long run by the interaction of wages, productivity, and technology. The profitability of any business enterprise depends on its ability to control costs—to use labor, equipment, energy, and materials in the most-efficient, least-cost combination possible. Over long periods, this results in a condition where profitable businesses use labor, capital, and other productive factors in such a manner that the real cost of each factor is in proportion to its productivity. As the real cost of labor changes relative to other factors of production, businesses will consequently strive to vary the amount of labor used in order to re-establish the relative balance between cost and productivity. (for example, if labor costs increase, businesses will try to reduce the amount of labor used.) The process by which this is done is known as "technological change," wherein less expensive factors are substituted for more expensive ones in the production process. Since a business cannot change its entire plant and equipment easily or quickly, the interaction of relative labor costs and technological change on the demand for labor is usually felt only in the long run.

Both long- and short-run influences have operated on the demand for labor in Alaska over the past two decades. The balance of this *Review* will examine the nature of Alaska's changing labor demand first by major industrial sector and then by occupational sector. The report concludes with a discussion of changes that may be expected to occur during the next decade in Alaska.

INDUSTRIAL LABOR DEMAND

Throughout the 1960s and early 1970s, the demand for labor in Alaska from all sources (including active military) increased at a moderate rate. Construction of the Trans-Alaska Pipeline System (TAPS) led to a rapid expansion in the state's labor demand during 1974 through 1976. However, after pipeline construction was completed in 1977, the growth of demand returned to its long-term trend (Figure 1). This trend, however, appears to have shifted upward, and the average annual increase in labor demand is now about 1,700 jobs a year greater than it was during the pre-pipeline period.

An economic data base for Alaska developed by ISER as part of its Man-in-the-Arctic program (MAP) allows for the organization of employment demand data into the categories suited for economic analysis. Using these data, Table 1 presents employment in Alaska between 1961 and 1980.

Throughout this period, active military employment declined and its relative importance for Alaska's economy fell significantly. During the early years of the 1960s, active military employment fluctuated between 32,000 and 33,000 persons, about half of total civilian employment in the state. By the end of the 1970s, active military personnel had declined to about 22,500 persons, less than 15 percent of the state's total civilian jobs. While there were fewer than two civilian workers for every military person in Alaska by 1961, by 1980 there were almost nine civilian workers for every active duty military person. The 20-year span from 1961 to 1980 consequently saw Alaska's economy shift from domination by the military sector to a situation where military activity, while still important, was no longer the dominant influence in the state.

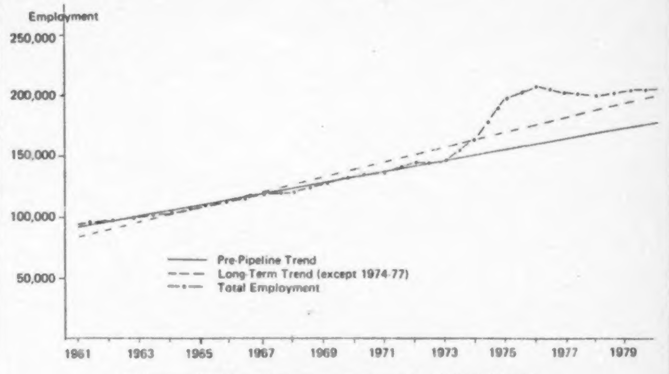

Figure 1. Employment Trends, 1961-1979

Table 1 and Figure 2 show the changing relationship between basic and total wage and salary employment in Alaska from 1961 through 1980. In the early 1960s there were approximately three quarters of a nonbasic job for every basic job in the economy.[2] By the end of the 1970s, this relationship had become almost one nonbasic job for every basic job. In terms of the technical structure of Alaska's labor markets, this implies a shift in the state's job creation multiplier.[3]

Between 1961 and 1973 basic and nonbasic employment increased in a roughly proportionate manner. Between 1973 and 1976, both types of employment grew rapidly as a result of the TAPS construction. With the end of TAPS construction,

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[2] We classify local and state governments in Alaska as "basic" activities since they derive most of their revenues from oil taxes and royalties which are unrelated to the level of earned income in the state. In other states, where state and local government services are mostly financed by revenues on locally earned income, they would be considered as "nonbasic" activities.

[3] The job creation multiplier is the ratio of total employment to basic employment.

Table 1

Alaska Employment, 1961-1980
(in thousands)

					Wage and Salary Employment		
Year	Total Employment	Active Military	Total Civilian Employment	Self Employment	Total	Basic	Nonbasic
1961	94.3	32.5	61.8	4.9	56.9	32.9	24.0
1962	97.1	33.0	64.1	5.4	58.7	34.5	24.2
1963	100.7	33.0	67.7	5.6	62.1	37.0	25.1
1964	103.8	32.4	71.4	6.0	65.4	39.0	26.4
1965	110.0	33.0	77.0	6.5	70.5	41.3	29.2
1966	113.5	33.2	80.3	7.1	73.2	43.8	29.4
1967	118.4	33.7	84.7	7.9	76.8	45.3	31.5
1968	120.2	32.6	87.6	7.8	79.8	46.8	33.0
1969	127.0	32.3	94.7	8.1	86.6	49.6	37.0
1970	132.9	31.4	101.5	9.0	92.5	52.1	40.4
1971	136.5	29.9	106.6	9.0	97.6	54.1	43.5
1972	144.1	30.8	113.3	9.1	104.2	57.4	46.8
1973	146.3	27.0	119.3	9.5	109.8	61.1	48.7
1974	163.7	25.5	138.2	10.0	128.2	68.3	59.9
1975	197.7	25.3	172.4	11.1	161.3	82.9	78.4
1976	207.5	24.4	183.1	11.9	171.2	89.8	81.4
1977	202.1	25.0	177.1	13.0	164.1	82.9	81.2
1978	199.8	22.5	177.3	14.0	163.3	81.3	82.0
1979	204.4	23.3	181.1	14.7	166.4	85.0	81.4
1980	206.1	21.3[a]	184.8	15.2[a]	169.6[b]	N/A	N/A

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[a] Estimated by 5-year linear extrapolation.

[b] Alaska Department of Labor, Research and Analysis, estimate.

Source: MAP Data Base, 1981 Revision.

total basic employment dropped sharply while nonbasic employment continued at a new, high plateau, and in one year (1978) was actually the larger of the two.

To fully understand these aggregate trends, it is necessary to look at the various major components of both the basic and nonbasic sectors.

Labor Demand by Basic Industries

Natural Resource Sector

Oil and Mineral Industries. Table 2 and Figure 3 show the extreme variation among the different industries that constitute Alaska's natural resource sector. The greatest volatility in this sector occurred in the oil and minerals group. Mining employment (including the exploration for oil) fluctuated at a low level of activity (1,000 to 1,500 workers) during the early 1960s. Intensive exploration on the North Slope caused a flurry of activity during the late 1960s; yet by 1973, total oil and minerals employment was only 800 workers greater than it had been 12 years earlier. Construction of TAPS changed all of that. Between 1973 and 1976, employment in the oil industry (including construction of TAPS) increased by over 18,000 workers, and the actual impacts of TAPS construction were even greater when non-oil-industry activity is included. In a detailed study of the influence of pipeline construction on the Alaska economy, Scott Goldsmith and Lee Huskey estimated that approximately 22,000 workers were employed by the Alyeska Pipeline Company: about 75 percent in construction; 15 percent in business services; and 8 percent in transportation, warehousing, communications, and trade (2 percent of the workers were

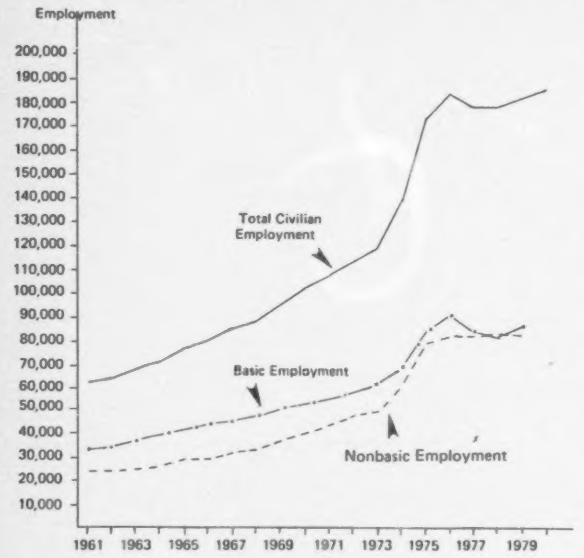

Figure 2. Basic and Nonbasic Employment

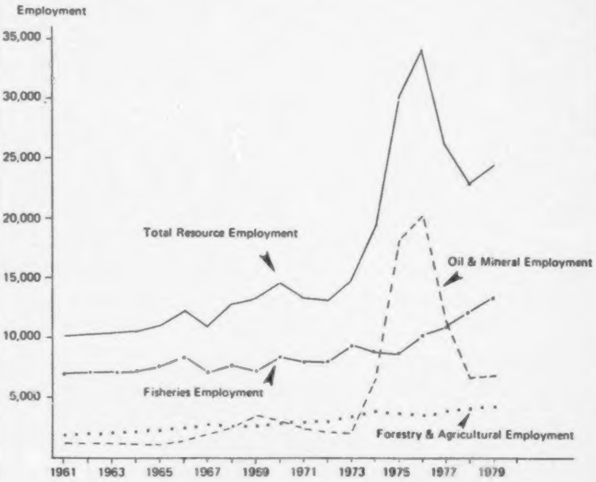

Figure 3. Resource Sector Employment

Table 2

Alaska Resource Sector Employment, 1961-1979
(in thousands)

		Oil and Minerals				Fisheries			Forestry and Agriculture		
Year	Total Resource Employment	Total	Mining	Pipeline Construction	Pipeline Transportation Operations	Total	Fishing[a]	Food[b] Processing	Total	Agriculture & Forestry Workers	Lumber, Wood, & Paper Workers
1961	10.2	1.2	1.2			7.0	4.2	2.8	1.9	0.2	1.7
1962	10.3	1.2	1.2			7.1	4.3	2.8	2.0	0.1	1.9
1963	10.4	1.2	1.2			7.1	4.1	2.9	2.1	0.1	2.0
1964	10.5	1.1	1.1			7.2	4.6	2.6	2.2	0.1	2.1
1965	11.0	1.1	1.1			7.6	4.6	3.0	2.3	0.1	2.3
1966	12.2	1.4	1.4			8.4	5.0	3.4	2.4	0.1	2.3
1967	10.9	2.0	2.0			7.1	4.0	3.1	2.7	0.1	2.6
1968	12.8	2.5	2.5			7.7	4.4	3.3	2.6	c	2.5
1969	13.3	3.5	3.5			7.2	4.0	3.2	2.6	0.1	2.5
1970	14.6	3.0	3.0			8.4	4.7	3.7	2.9	0.1	2.8
1971	13.3	2.4	2.4			8.0	4.4	3.6	2.9	0.1	2.8
1972	13.1	2.1	2.1			8.0	4.3	3.7	3.0	0.2	2.8
1973	14.8	2.0	2.0			9.4	4.8	4.6	3.4	0.2	3.2
1974	19.1	6.4	3.0	3.4		8.8	4.5	4.3	3.8	0.2	3.6
1975	30.6	18.2	3.8	14.4		8.7	4.4	4.3	3.6	0.2	3.4
1976	34.1	20.3	4.0	16.3		10.3	5.1	5.1	3.5	0.3	3.2
1977	26.1	11.4	5.0	5.8	0.6	10.9	5.4	5.5	3.8	0.4	3.4
1978	23.0	6.7	5.6		1.1	12.3	6.0	6.3	4.1	0.5	3.6
1979	24.5	6.9	5.8		1.1	13.5	6.4	7.1	4.2	0.5	3.7

[a] Estimates of fishing employment constructed by George Rogers.

[b] Almost all (about 95 percent) of Alaska's food-processing employment takes place in its fisheries.

[c] Less than 50 employees.

Source: MAP Data Base.

miscellaneous or otherwise unaccounted for).[4]

Continued oil exploration coupled with increased mining activity related to the rising price of precious metals gave this sector an average annual employment of between 6,500 and 7,000 workers during the last few years of the 1970s, even after pipeline construction was completed.

Fishing and Fish Processing. The second major component of the resource sector relates to fishing and fish processing. In terms of total workers employed, this component was highly stable throughout the 1960s and early 1970s, employing between 7,000 and 8,500 workers. During the late 1970s, a series of record salmon runs produced rapid growth in fisheries employment (particularly in the industry's fresh and fresh-frozen fish parts), with total jobs increasing to approximately 13,500 in 1979.

Fisheries employment, however, has been more stable on a year-to-year basis than is indicated by the data in Table 2 or Figure 3. This industry regularly adjusts its labor demand by average hours worked as well as the number of persons hired. Table 3 shows food-processing employment during the years 1970 through 1975. It also shows the average weekly hours worked within Alaska's manufacturing sector and the adjusted (i.e. full-time equivalent) employment. Over the 6 years shown in Table 3, the average annual variation in employment was about 10.4 percent when calculated on the basis of persons employed, but was only about 7.9 percent when calculated from the adjusted, full-time equivalent work force.[5]

The fisheries component of the total resource sector consequently displays two striking characteristics. First, adjustments in average hours worked cause the work force to exhibit more year-to-year stability than is apparent from the unadjusted employment data. Second, within any single year, there is extreme seasonal variation in employment. For example, in 1974 employment showed a seasonal variation of approximately 35 percent, as compared with the state average for the same year of approximately 12 percent. This combination of seasonal fluctuations in demand coupled with annual average adjustments in hours worked makes labor demand in the fisheries sector one of the most complex in Alaska.

Table 3
Adjusted Fish Processing Employment

Year	Food Processing* Employment (in thousands)	Average Weekly Mfg. Hours	Full-Time Adjusted Employment (in thousands)
1970	3.7	41.2	3.8
1971	3.6	40.1	3.6
1972	3.7	40.1	3.7
1973	4.1	36.6	4.2
1974	4.3	40.5	4.4
1975	4.3	36.6	3.9

*See footnote b, Table 2.

Source: Food processing employment: MAP Data Base; Average Weekly Manufacturing Hours: BL3, *Handbook of Labor Statistics*, 1980.

Forestry and Related Activities. The final labor demand component of Alaska's resource sector is forestry and related activities. This component exhibited a slow, stable pattern of growth in labor demand between 1961 and 1979. Workers involved in lumber, wood, and pulp manufacturing increased by approximately 2,000 over the 19-year period. Forestry employment is generally concentrated in Southeast Alaska, and the stability of labor demand, in large part, reflects federal policies limiting the number of cutting circles (and the established sustained yield cut) on federal lands. Labor demand in this component is substantially derived from the demand for wood products in foreign countries, particularly Japan.

While the current world-wide recession has caused a short-term fall in demand in Alaska's forest products industry, it also appears that Japan's own log production (which increased in the late 1970s), will have a long-term adverse affect on Alaska's forest products industry.[6]

Consequently, of all the labor demand components of Alaska's resource sector, the forest products industry exhibited the slowest rate of growth during the 1960s and 1970s, and this trend will probably continue during the 1980s.

Government Sector

The second major sector making up Alaska's basic demand for employment is government, and the trends in this sector are shown in Table 4 and illustrated in Figure 4. Overall, total government employment exhibited substantial growth over the period 1961 through 1979, growing from about 56,000 workers to about 78,000 workers, an increase in labor demand of about 22,000 jobs.

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[4] Scott Goldsmith and Lee Huskey, "Structural Changes in the Alaskan Economy: The Alyeska Experience," paper presented at the 29th Alaska Science Conference, August 1978.

[5] The average annual variation in employment was calculated by dividing the standard deviation of the employment series by the mean (average) employment level over the 6-year period.

[6] Brit Harvey, "Alaska Exports to Japan," *Alaska Economic Trends*, January 1982.

Federal Employment. Although total government employment in Alaska grew over the 19-year period, 1961-1979, federal government employment declined by about 15 percent. This decline resulted from reduced levels of active duty military personnel stationed in Alaska. Federal civilian employment on the other hand increased slightly during the early 1960s and then remained stable at about 17,500 workers between 1965 and 1979. Federal employment as a percentage of total government employment in Alaska declined from about 85 percent in 1961 to about 53 percent in 1979.

The decline in federal military employment did

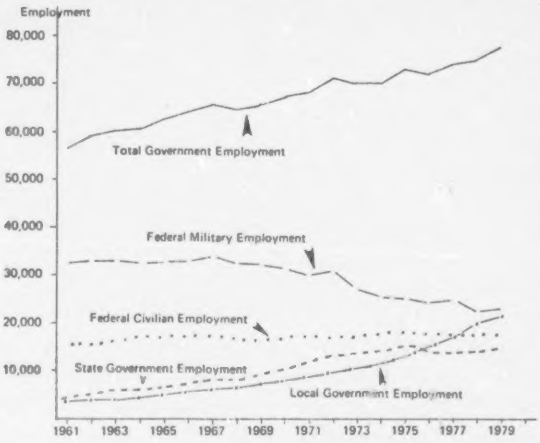

Figure 4. Government Sector Employment

Table 4

Government Sector Employment in Alaska, 1961-1979

(in thousands)

Year	Total Govt.	Federal Government Total	Federal Government Military	Federal Government Civilian	State Govt.	Local Govt.	Native* Corp.
1961	56.3	48.1	32.5	15.6	14.6	3.6	
1962	58.0	48.7	33.0	15.7	5.2	4.1	
1963	60.0	49.6	33.0	16.6	6.2	4.3	
1964	60.4	49.6	32.4	17.3	6.3	4.6	
1965	62.7	50.4	33.0	17.4	7.0	5.3	
1966	64.1	50.7	33.2	17.5	7.7	5.7	
1967	65.5	51.1	33.7	17.4	8.1	6.3	
1968	64.7	49.5	32.6	16.9	8.6	6.6	
1969	65.6	48.8	32.3	16.5	9.3	7.5	
1970	67.0	48.6	31.4	17.1	10.4	8.1	
1971	67.9	47.2	29.9	17.3	11.7	9.0	
1972	71.3	48.0	30.8	17.2	13.3	10.0	
1973	70.0	44.2	27.0	17.2	13.8	10.6	1.4
1974	70.0	43.5	25.5	18.0	14.2	11.6	0.7
1975	72.9	43.6	25.3	18.3	15.5	13.3	0.5
1976	71.9	42.3	24.4	17.9	14.1	15.2	0.3
1977	74.1	42.7	25.0	17.7	13.9	17.2	0.3
1978	75.3	40.6	22.5	18.1	14.3	20.0	0.4
1979	78.4	41.2	23.3	17.9	15.0	21.6	0.6

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*Native Corporation employment constructed by Scott Goldsmith of the Institute of Social and Economic Research from Native Claims Payment Data.

Source: MAP Data Base.

not adversely affect Alaska's economy as would have equivalent declines in the civilian workforce. Military personnel have relatively low levels of per capita income and consequently generate relatively low levels of demand for goods and services produced elsewhere in Alaska's economy. In 1978, for example, total wage and salary income earned by military personnel stationed in Alaska averaged just under 50 percent of the wage and salary income earned by federal civilian employees. Reductions in military employment consequently had only about one-half the impact that equivalent reductions in federal civilian employment would have produced.

State and Local Government. Both state and local government in Alaska substantially increased their work forces during 1960 through 1979. After growing at a moderate pace throughout the 1960s, state government demand for labor increased by about 1,000 workers per year during 1970 through 1975. After 1975, however, state government employment stabilized around 15,000 workers and was actually slightly lower in 1979 than it had been in 1975.

The demand for labor by local government generally paralleled the state government trend throughout the 1960s and then grew less rapidly during the first half of the 1970s. From 1975 through 1979, however, local government employment increased rapidly. In fact, during this 5-year period, local government increased by about 10,000 workers, while the increase during the prior 14 years had only been 8,000. Several factors seem to have produced this rapid growth. First, it appears that public school employment throughout the state grew rapidly during the last half of the 1970s and accounted for a significant part of local government employment growth. The passage of the federal government's Comprehensive Employment and Training Act (CETA) in 1973 and the Emergency Jobs and Assistance Act in 1974 provided funds to local governments for new jobs for unemployed residents (although funded through federal appropriations, the CETA workers were reported as part of the local government work force). In the first few years of the 1980s, however, the federal administration phased out all funding for public employment and training programs and completely eliminated the two sections of CETA which provided for direct public service job creation.

Other Basic Sectors

The two remaining sectors of Alaska's basic employment demand are tourism and heavy construction, both of which are reported in Table 5.

Tourism. The demand for labor derived from tourism in Alaska is scattered over the transportation, personal services, and retail trade industries. While no single one of these components of tourism employment is large, together they accounted for almost 4,500 workers in 1979. When viewed as a whole, the tourism sector displayed slow but steady growth throughout 1961 to 1979. By 1980 it generated a larger demand for labor than the state's entire forest products industry.

Heavy Construction. Heavy construction employment was stable between 1965 and 1979, except for the immediate post-pipeline period—1976-1978—when it increased sharply from about 4,500 workers to an average of about 8,000 workers. This jump in basic construction employment was not part of pipeline construction but was related to it. It came from the construction of the oil port and terminals at Valdez, which was induced by TAPS but was apparently reported separately as independent heavy construction.

The relative stability of basic construction employment during most of the historical period 1961-1979 appears to stem from the slow increase in major commercial or industrial capital improvement projects in Alaska. During the early 1980s, substantial commercial construction has been occurring in the Anchorage area, giving rise to a growth of labor demand in the basic construction sector. However, this phenomenon started after the period covered by the historical data presented in Table 5.

Labor Demand by Nonbasic Industries

When we turn from the demand for labor generated by basic industries in the state to the demand generated by nonbasic industries, a different picture emerges. While basic employment demand was dominated by a few sectors, (oil development and state government in the early and mid-1970s and fisheries and local government in the late 1970s) nonbasic employment demand grew with relative uniformity among all sectors. The sharp rise in nonbasic employment which occurred between 1973 and 1976 represented a cumulation of employment demands in the state's trade; service; transportation, communications, and utilities; and finance, insurance, and real estate sectors. These trends are illustrated in Figure 5 and presented in Table 6. All of the nonbasic sectors (excluding nonbasic construction which will be discussed below) exhibited an average annual rate of compound growth in labor demand of between 7 and 9 percent throughout the 19-year period (1961-1979).

Trade

Trade employment (excluding tourism) exper-

Table 5

Other Basic Employment, 1961–1979
(in thousands)

Year	Total Other Basic Employment	Total Tourism Employment	Component of Tourism* Transportation	Services	Retail Trade	Basic Construction Employment
1961	3.1	0.7	0.1	0.3	0.3	2.4
1962	3.3	0.8	0.2	0.3	0.3	2.5
1963	3.7	0.8	0.2	0.3	0.3	2.9
1964	4.9	1.0	0.2	0.4	0.4	3.9
1965	5.3	1.0	0.2	0.4	0.4	4.3
1966	5.1	1.1	0.2	0.5	0.4	4.0
1967	5.4	1.3	0.3	0.5	0.5	4.1
1968	5.5	1.4	0.3	0.6	0.5	4.1
1969	5.9	1.5	0.3	0.6	0.6	4.4
1970	6.3	1.8	0.4	0.7	0.7	4.5
1971	6.8	1.9	0.4	0.8	0.7	4.9
1972	7.2	2.1	0.4	0.9	0.8	5.1
1973	7.2	2.4	0.5	1.0	0.9	4.8
1974	9.0	2.6	0.5	1.1	1.0	6.4
1975	8.7	2.9	0.6	1.2	1.1	5.8
1976	11.0	3.2	0.7	1.3	1.2	7.9
1977	11.3	3.6	0.7	1.5	1.4	7.7
1978	10.8	3.9	0.8	1.6	1.5	6.9
1979	9.9	4.3	0.9	1.8	1.7	5.6

*Estimates of industry shares allocated to tourism constructed by Scott Goldsmith.

Source: MAP Data Base.

ienced remarkably steady growth with only a slight increase in its growth rate during the pipeline period. In large part, the increased growth rate exhibited during pipeline construction was centered in the wholesale component of trade which appears to be more closely linked to the level of general business activity than it does to consumer demand.

Services

In a similar manner, employment in the personal services component of total service (excluding tourism) demand grew quite steadily during 1961-1979, while business service employment showed a clear bulge during the pipeline construction period. This bulge resulted both from direct employment and contracting for business services by the Alyeska Pipeline Company.

Also stimulating the demand for business services during the period was the state government, which often contracts with private firms for services and studies.

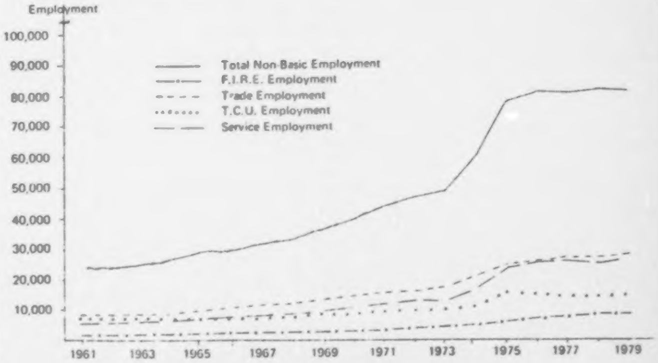

Figure 5. Nonbasic Employment

Transportation, Communication, Utilities

The transportation, communications, and utilities (TCU) sector (excluding both tourism-linked transportation and direct pipeline-related activity)

Table 6

Alaska Nonbasic Employment, 1961–1979
(in thousands)

Year	Total Nonbasic	Trade (except Tourism)			(Services (except Tourism)			Finance, Insurance & Real Estate	Transport. & Communication (except Tourism & Pipeline)	Public Utilities	Nonbasic Construction
		Total	Retail	Wholesale	Total	Business	Personal				
1961	24.0	7.9	6.3	1.6	5.4	0.7	4.7	1.5	6.5	0.4	2.3
1962	24.2	7.9	6.3	1.6	5.7	0.9	4.8	1.7	6.3	0.5	2.1
1963	25.1	8.3	6.7	1.6	6.0	1.0	5.0	1.9	6.2	0.5	2.2
1964	26.4	8.5	6.8	1.7	6.4	1.2	5.2	2.0	6.1	0.6	2.8
1965	29.2	9.6	7.7	1.9	7.1	1.4	5.7	2.2	6.4	0.7	3.2
1966	29.4	10.3	8.2	2.1	7.4	1.4	6.0	2.3	6.4	0.7	2.6
1967	31.5	11.3	8.9	2.4	8.2	1.6	6.6	2.3	6.5	0.7	2.5
1968	33.0	12.0	9.4	2.6	8.8	1.8	7.0	2.5	6.8	0.7	2.2
1969	37.0	13.3	10.4	2.9	9.8	2.1	7.7	2.7	7.7	0.8	2.7
1970	40.4	14.7	11.5	3.2	10.7	2.0	8.7	3.1	7.9	0.8	3.2
1971	43.5	15.4	12.2	3.2	11.8	2.1	9.7	3.2	8.5	0.9	3.7
1972	46.8	16.2	12.9	3.3	13.2	2.1	11.1	3.7	8.6	0.9	4.2
1973	48.7	17.4	14.0	3.4	12.8	2.1	10.7	4.2	8.9	1.0	4.4
1974	59.9	20.1	16.1	4.0	16.6	2.9	13.7	4.9	10.8	1.0	6.5
1975	78.4	25.1	19.2	5.9	23.4	7.3	16.1	6.0	14.8	1.1	8.0
1976	81.4	26.3	20.2	6.1	26.1	8.7	17.4	7.1	14.0	1.2	6.7
1977	81.2	27.1	21.2	5.9	25.7	7.0	18.7	7.8	13.0	1.3	6.3
1978	82.0	27.3	21.6	5.7	25.6	5.2	20.4	8.2	13.1	1.4	6.4
1979	81.4	27.7	22.2	5.5	26.0	4.8	21.2	8.0	13.3	1.4	5.0

Source: MAP Data Base.

underwent a steady growth of employment demand, punctuated by a fairly rapid rise in its work force during the early pipeline years. As with the other nonbasic sectors, TCU employment appears to derive primarily from the growth of Alaska's consumer income and purchasing power. However, the transportation sector was particularly affected by the pipeline as large amounts of construction materials and large numbers of workers were transported to Alaska. Public utility employment, on the other hand, has increased moderately but steadily throughout the 19-year period, 1961 through 1979.

Construction

Nonbasic construction employment in Alaska primarily consists of workers employed in building single-family residences and other forms of housing. This type of employment demand derives more from population growth than it does from the growth of personal income. Consequently, this type of employment demand grew rapidly during pipeline construction as Alaska's population increased significantly. However, when the demand for nonbasic construction workers fell in the immediate post-pipeline period, Alaska appears to have exhibited a net loss of population.

Summary

Overall, industrial labor demand in Alaska has shifted during the last 20 years from a dominance by Federal defense activity to dominance by today's natural resource sector. When oil revenues used to support the growth of state and local government are included, natural resource activity is the dominant force affecting the demand for labor among basic industries in the state. Among nonbasic industries, retail trade; personal services; finance, insurance, and real estate; and transportation, communications, and utilities all appear to derive their demand for labor primarily from the growth of consumer income. Business services and wholesale trade are more closely linked to the general level of business activity and derive their labor demand primarily from interindustry labor demand. Nonbasic construction appears to be primarily related to the growth of the state's population.

OCCUPATIONAL LABOR DEMAND

Occupational labor demand is affected by many factors, some of which we understand only imperfectly. These factors include changes in productive technology and changes in consumer demand for goods versus services. In addition, larger businesses may exhibit differences between their occupational requirements and their occupational demands because of internal labor markets. Notwithstanding these qualifications, understanding patterns of occupational demand is important since a mismatch between skills desired by employers and those possessed by the unemployed can cause structural unemployment; i.e., the inability of Alaskans to find jobs despite high levels of total labor demand.

Figure 6 presents the occupational distribution of Alaska's labor force during 1973 and 1977-1979. The comparisons shown in Figure 6 are not precise because the two sets of data come from different sources which used different estimating techniques.[7]

Notwithstanding these difficulties, it appears that over the last decade, the demand for clerical and, in particular, service workers has been rising compared to all other occupations.[8] This more rapid rate of growth is in large part attributable to the pattern of industrial labor demand discussed earlier. The rapid rates of growth in trade, finance, insurance, real estate, and other nonbasic industries contributed to the increase in the demand for clerical skills. At the same time, these industries, plus tourism, produced an increase in the demand for building maintenance and food-service workers, such as waiters/waitresses, counter attendants, and cooks. Finally, the growth of public services caused an increase in the demand for childcare workers, social-service aides, medical assistants, and related occupations. These trends become evident when we examine the occupational structure of labor demand associated with the various industries in Alaska's economy.

Government

Federal

Table 7 presents the occupational distribution of workers employed in the government sector. Reflecting the many technical functions performed by the federal government here, approximately 30 percent of all federal civilian workers in Alaska have either professional or technical jobs, while an additional 25 percent provide clerical support. At the same time, approximately one out of every three federal civilian employees is engaged in some type of maintenance or production occupation, reflecting the extensive federal facilities (particularly military) in Alaska. The relatively small number of managers and administrators employed by the federal government in Alaska (6.2 percent) reflects the operational nature of federal activities here with most managers and administrators located at the various regional headquarters in Seattle.

State and Local Government

State government's administrative employment is also similarly concentrated in professional and technical occupations (31.5 percent), reflecting the active management of state programs, with slightly better than 18 percent of all state non-educational workers classified as managers or administrators. In contrast, local government is most often the operator of public programs and has relatively low concentrations of professional, technical, managerial, and administrative workers. Also reflecting the operational nature of local government activity is the relatively high concentration of maintenance, production, and service workers who comprise almost 52 percent of all local government non-educational employment.

Educational employment at the state level involves the operation of Alaska's post-secondary educational institutions. At the local level, it involves operating the public schools from kindergarten through high school. At both the state and local levels, however, over half of all educational workers are in the professional and technical category while an additional 21 to 23 percent are employed in clerical support activities.

The rapid growth of local government employment, compared with state government, helps to explain the decline in percentage of managers and administrators between the early and late 1970s.

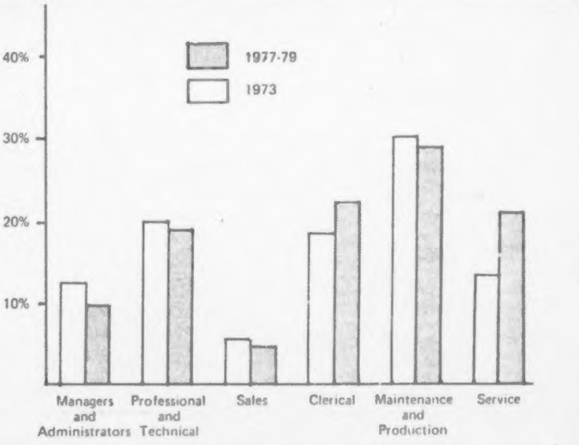

Figure 6. Occupational Distribution of the Labor Force

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[7] Data for the 1977-79 period comes from surveys of Alaska employers who are covered by Alaska's Employment Security Act, as reported in the various *Occupational Employment Statistics* publications issued by the Alaska Department of Labor. Data for the 1973 period comes from a computer tape of 440 occupations by 227 industries, developed from the 1970 census (as reported in "A Forecast of Industrial and Occupational Employment in Alaska," ISER, 1974).

[8] The total demand for workers in all occupations rose in Alaska during the decade of the 1970s. The relative growth of clerical and service workers, compared with all other occupations, implies that these occupational categories were rising more rapidly, not that the other occupations were falling.

Averaged over all forms of civilian government employment, however, this sector's occupational patterns are still concentrated in white collar activities. More than two out of every three government employees are involved in managerial, administrative, professional, technical or clerical occupations, while less than one out of every three is involved in maintenance, production, or services. Because local government employment has been growing more rapidly than that of state government in recent years, the demand for blue-collar trade and service workers has increased more rapidly than would have been true had all sectors of government grown proportionately.

Manufacturing

In contrast to government, with its high concentration of white-collar workers, Alaska' manufacturing firms have a high concentration of blue-collar employees. On the average, over four out of every five manufacturing workers are involved in some type of maintenance, production, or service activity—with the greatest concentration being in production occupations (Table 8).

Construction

In a similar manner, the construction trades in Alaska are dominated by blue-collar workers, with over three out of every four construction employees being involved in some type of maintenance or production activity (Table 9).

Mining, Oil, and Gas

Mining, and oil and gas employment is also concentrated in maintenance and production activities, but reflecting its high technology, this group of industries employs almost 25 percent of its work force in professional and technical occupations—a significantly higher proportion than is true for either manufacturing or construction.

Nonbasic Industries

The data presented in Table 10 on the occupational distribution of nonbasic employment in Alaska displays patterns markedly different from those found in such basic employment sectors as government, manufacturing, or construction.[9] For example, the demand for clerical and service workers in the nonbasic sectors is substantially higher than the basic sectors while the demand for maintenance and production workers is substantially lower. Managerial, administrative, professional, and technical workers are more in demand in the nonbasic sectors than in all basic sectors except government. Overall, occupational demand among nonbasic industries is more concentrated in occupations (both white- and blue-collar) requiring lower skills.

Summary

The demand for labor in Alaska, in contrast to the United States as a whole, is more highly concen-

Table 7

Occupational Distribution of Government Employment

		Federal Government	State Government			Local Government		
Position Title	Total Government	Total Federal Civilian[a]	Total State	Administration[b]	Education[a,c]	Total Local	Administration[b]	Education[a]
Manager or Administrator	9.4%	6.2%	15.7%	18.1%	9.4%	6.9%	9.2%	5.5%
Professional and Technical	34.6	30.1	38.5	31.5	55.5	36.1	12.7	51.2
Sales	0.2	0.4	0.1	0	0.4	0.1	0.1	0
Clerical	24.1	24.9	25.2	26.1	22.7	22.8	26.0	20.7
Maintenance and Production	20.6	33.9	9.9	11.1	6.2	17.2	33.2	6.8
Service	11.1	4.5	11.0	13.0	5.8	17.0	18.7	15.9

[a] 1977 Data.
[b] 1979 Data.
[c] Includes estimated 3.7 percent private post-secondary education employment.

Note: Columns may not add up to 100 percent due to rounding.
Source: *Occupational Employment Statistics*, Alaska Department of Labor.

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[9] The terms "basic" and "nonbasic" are used in this section to refer to industry activities, where in the preceding section they referred to sectors of the economy. Although the terms refer to essentially the same industrial groupings, this distinction (necessitated by data availability) should be kept in mind.

Table 8

Occupational Distribution of Manufacturing Employment[a]

Position Title	Total Manufacturing	Food Processing	Forest Products[b]	Printing & Publishing	Other Manufacturing
Manager or Administrator	4.6%	4.2%	3.6%	7.9%	8.2%
Professional and Technical	2.8	1.1	3.3	13.3	4.0
Sales	1.4	1.0	0.8	5.5	2.9
Clerical	8.0	7.1	4.8	29.3	10.0
Maintenance and Production	77.9	80.9	81.0	42.9	73.6
Service	5.3	5.7	6.6	1.0	1.3

[a] 1977 data.

[b] Including lumber, wood products, and pulp.

Note: Columns may not add up to 100 percent due to rounding.

Source: *Occupational Employment Statistics,* Alaska Department of Labor.

trated in the white-collar occupations. Furthermore, white-collar and blue-collar occupations in Alaska represent quite different patterns of labor demand than they do in the other states. This is illustrated in Figure 7 which compares the occupational distribution in 1979 of Alaska and the United States, excluding farm workers.[10]

In the white-collar occupations here, the demand for labor is relatively concentrated in jobs requiring high levels of education and skill. In blue collar occupations, the demand for labor is relatively concentrated in jobs requiring lower skills. This pattern appears to result from the large size of government and the small size of manufacturing in this state's basic economic sector. It in turn results in a condition where jobs traditionally held by older and better educated workers make up a disproportionately large share of the total labor demand in Alaska, while the occupations traditionally held by younger, lesser-educated workers[11] make up a smaller share of total labor demand than is true in the rest of the United States.

Table 9

Occupational Distribution of Other Basic Employment*

Position	Total	Mining, Oil & Gas	Construction
Manager or Admin.	8.4%	5.0%	9.7%
Profess. & Tech.	9.8	24.5	3.8
Sales	0.9	0.6	1.0
Clerical	9.2	11.6	8.2
Maint. & Prod.	70.0	56.3	75.6
Service	1.8	1.9	1.7

*1978 data.

Note: Columns may not add up to 100 percent due to rounding.

Source: *Occupational Employment Statistics,* Alaska Department of Labor.

CONCLUSIONS

Alaska's demand for labor is derived from the tastes and preferences of consumers in the state, the nation, and the world. During the 1960s, these preferences were focused primarily on the state's forestry and fishery resources and its geographic location, which gave Alaska a unique importance in the nation's defense system. This resulted in the dominant importance of military (including civilian military) employment in the state's economy, followed by employment in the fishing and forest products industries. The income generated by these activities produced the in-state consumer demand for retail goods and services. As a result, the demand for labor from international, national, and state sources grew in a roughly proportionate manner throughout the 1960s.

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[10] U.S. Data was obtained from the *Handbook of Labor Statistics* (Bulletin 2070), U.S. Department of Labor, December 1980.

[11] Workers who are new to the labor force and are seeking to acquire skill advancement.

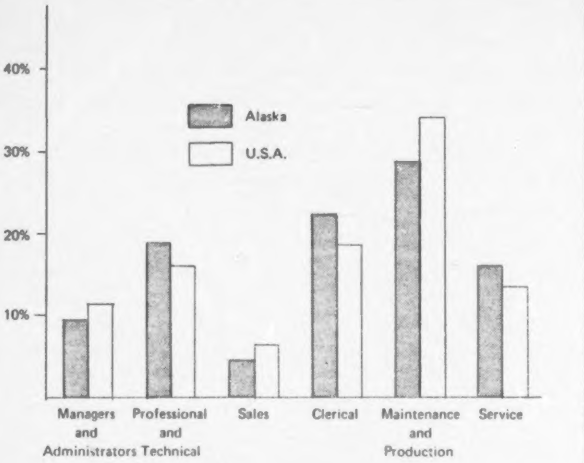

Figure 7. Alaska and U.S.A. Occupational Distributions, 1979 (excluding farm workers)

During the first part of the 1970s, the growth of state expenditures (financed by the $900 million oil lease sale revenues received in 1969) produced a rise in the state's real personal income that was unrelated to any growth of basic sector employment. As a result, employment in trade, finance, services, and other nonbasic activities increased more rapidly than did the economy's basic sector. White-collar occupations (which had traditionally dominated Alaska's labor markets due to the large size of government employment) became even more concentrated while the major growth of blue-collar jobs shifted from operations and maintenance trades requiring higher skills to service trades requiring lower skills.

This pattern was reversed by construction of the Trans-Alaska Pipeline System and its terminal facilities at Valdez during 1974 through 1977. During this time, Alaska's labor markets underwent a rapid growth of construction and other blue-collar jobs requiring higher skills. The rapid growth of personal income caused by TAPS also caused a sharp rise in demand for labor in the trade and service sectors.

Completion of TAPS construction saw a return to the labor market pattern of the early 1970s. Financed by revenues from oil taxes and royalties, state expenditures triggered a growth of demand for trade and service workers unrelated to any expansion in the state's basic sector employment. As a result, nonbasic employment remained high even though the demand for labor in oil and mineral activities declined by almost 14,000 workers between 1976 and 1978.[12]

Equally important, the expanding sectors of

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[12] The growth of fisheries, local government, and tourism helped offset the large employment loss in oil and minerals, but total basic employment still declined significantly over the period.

Table 10

Occupation Distribution of Non-Basic Employment

				Services[b]		
Position Title	Trade[a]	TCU[a]	Fire[b]	Total	Personal & Business Services	Professional Services
Manager or Administrator	11.6%	9.0%	18.9%	10.2%	8.8%	11.5%
Professional and Technical	3.0	19.2	8.4	22.5	8.2	36.7
Sales	24.3	1.4	5.5	1.6	2.8	0.5
Clerical	22.3	25.9	56.5	23.2	18.9	27.6
Maintenance and Production	20.5	40.6	6.1	12.7	17.6	7.9
Service	29.3	3.9	4.7	29.7	43.8	15.8

[a] 1979 data.
[b] 1978 data.

Note: Columns may not add up to 100 percent due to rounding.

Source: *Occupational Employment Statistics*, Alaska Department of Labor.

basic employment during the the late 1970s (except for fisheries) generated a relatively high demand for white-collar jobs, a trend reinforced by the strong growth of the state's nonbasic sectors. Contrary to many non-Alaskans' conception of the state, Alaska's labor markets by the end of the 1970s were generating a demand for white collar workers (particularly professional and technical workers) substantially greater than was true for practically anywhere else in the nation.

As Alaska moves further into the 1980s it becomes increasingly important to understand and anticipate the patterns of labor demand in the state. Labor markets appear to be segmented by industry, by occupation, and by size of firm. As a result, the growth of total employment in the state is no guarantee that resident Alaskans will be able to find well-paying, stable jobs that offer them potential for career advancement. If these labor market benefits are to be achieved through the process of economic growth, we will need to gain a better understanding of the structure of labor demand in the state.

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Reflections on the End of the OPEC Era

This paper is intended to put the OPEC oil-price rises of the 1970s and the more recent oil-price decline into historical perspective. Alaskans can then weigh the chance that energy prices will resume their upward climb, giving new momentum to economic growth in the state, against the prospect that the OPEC era is indeed over—meaning that Alaska, along with other energy-exporting regions, must accept a radical and mostly downward adjustment in its development expectations.

Oil Prices and Alaska's Economy

Alaska's labor force, population, and personal income have been increasing faster than those of any other state for almost a decade. Very little of this growth would have happened without the two great surges in world oil prices that most people identify with the rise of OPEC—the Organization of Petroleum Exporting Countries.

The fivefold price increase for Middle Eastern crude oil in 1973-74 and the resulting threefold increase in the market value of U.S. domestic crude oil made it economically feasible to develop the Prudhoe Bay field and complete the Trans-Alaska oil pipeline (TAPS). Even if real oil prices had remained at their 1975-78 levels, Prudhoe Bay oil royalties and taxes would have made Alaska the richest state government *per capita* throughout the 1980s, and the spending and respending of these revenues in Alaska would have combined with continuing private investment in energy resources to put Alaska among the faster-growing states in income and employment.

World oil prices took off once more in 1979-80, however. Real prices at the Persian Gulf "only" tripled this time, but the stability of transportation charges between the North Slope and Lower-48 refineries caused the price of Prudhoe Bay oil—and consequently Alaska's royalty and severance-tax collections—to grow almost five-fold. At their peak in 1981, oil revenues were flowing into the state treasury at an annual rate of more than $10,000 per capita. The effect of this bonanza on state spending for government operations, transfer payments, loan programs, and public works was as awesome as it was predictable. In 1980 the Legislature abolished personal income taxes, and in 1982 it voted to distribute a "Permanent Fund dividend" check of $1,000 to each resident.

By the second quarter of 1981, when crude-oil prices began their present downward trend, most private and governmental planning in the state had come to reflect the assumption that oil prices, and with them the prices of other fossil fuels, would keep rising without limit. Disagreement about the long-term oil price outlook was largely confined to the question of whether price increases would average 2, 3, or 5 percent in excess of general inflation.

The prospect of ever-rising oil prices implied that Prudhoe Bay would generate more and more revenue for the state, and that the spending and respending of that revenue would provide more and more public- and private-sector jobs. It also promised to sustain a high level of exploration activity on state lands and the federal outer continental shelf (OCS) and, most likely, a series of major new discoveries. Rising oil prices convinced sponsors of the proposed Alaska gas pipeline that they could just about ignore the difficulty of marketing North Slope gas as a constraint on the project's economic feasibility.

An ever-increasing real price of oil on world markets also seemed to assure Alaska a petrochem-

This report was adapted from the appendix of a larger study entitled "Alaska Energy Planning Studies," performed by Arlon R. Tussing and Gregg K. Erickson for the Division of Policy Development and Planning, Office of the Governor, October 1982.

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FEATURE

Arlon R. Tussing — Reflections on the End of the OPEC Era

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icals boom based on the growing cost advantage North Slope natural-gas liquids (NGLs) would have over oil-based petrochemical feedstocks used elsewhere; it also seemed to guarantee development of Alaska's coal for export. Higher and higher prices for oil meant, moreover, that natural gas and coal would be too valuable to use for generating electric power in Alaska; this outlook has been the main rationale for planning a multi-billion dollar hydroelectric generating plant on the Susitna River and has led many legislators to believe that the state would be able to finance the Susitna project with a direct appropriation from the General Fund.

The price of oil is thus the biggest single outside influence on Alaska's economy, and in 1982, uncertainty about the oil-price outlook has become the biggest single source of uncertainty about the state's economic future. The possibility that the oil-price boom may be over has profound consequences which thus far have been easier to ignore in Alaska than in other energy-exporting areas.

Since the upward movement of oil prices ended in 1981, economic distress has already overtaken many of the top oil-exporting countries. By the end of 1982, all but two OPEC nations are likely to be in a deficit fiscal and foreign-exchange position. In less than a year, a record boom has given way to a grave depression in the deep-gas areas of Oklahoma, among oilfield-service contractors, and for the financial institutions that specialized in backing them. All but a handful of synthetic-fuels projects have now been abandoned, and the future of those remaining is doubtful.[1]

Several forces have joined to perpetuate a petroleum-driven boom in Alaska that has lasted longer than in other petroleum-exporting regions. Most crucial has been the fact that actual spending of state money appropriated in 1980 and 1981 has continued to increase month by month well into 1982. Another factor has been the momentum of North Slope oil exploration and development programs, some of which would be economical at any world oil-price level higher than (say) $10 per barrel. A third element in the present boom is a host of Anchorage commercial building projects for which the key decisions and commitments were made before 1981. Finally, the continuing increase in the amount of state money actually flowing into the economy has combined with the flow of oil-industry investments to perpetuate a mood of high optimism among private investors in Alaska's non-energy industries, particularly residential and commercial real-estate development.

Nevertheless, in 1982, the beginnings of a downward slide in world oil prices has already drastically altered the state government's official view of the future. From June 1980 through January 1982, the Alaska Department of Revenue's quarterly *Petroleum Production Revenue Forecast* had been predicting that nominal-dollar ("inflated") oil revenues would increase over the 4 years beginning on each forecast date at a compound annual rate between 12.2 and 25.8 percent. In its March 1982 *Forecast*, the department's 3-year estimate of the expected annual change in state revenues fell abruptly to a *negative* 0.8 percent.[2]

Specifically, the "most likely" projection in the March *Forecast* was that the weighted average wellhead value for Alaska North Slope (ANS) crude oil in fiscal year (FY) 1983 would be 29 percent lower than in FY-1982, and that world prices would then resume their nominal-dollar increase at a compound annual rate of about 7 percent. The department did not expect prices to regain FY-1982 levels until the beginning of FY-1987. With respect to constant-dollar ("real") oil prices, the March *Forecast* boldly reported "a consensus that oil prices will continue to fall,"[3] and projected declining real oil prices through 1998.[4] Table 1 above compares the state's June 1981 and 1982 forecasts.

The 1981 Turning Point

At the end of 1981, oil prices were suffering their greatest decline in half a century, but industry executives and forecasters—even outside Alaska—cautioned that the attendant "glut" was a temporary phenomenon.[5] Despite many signals to the contrary, that opinion has persisted well into 1982, with Occidental's Chairman Armand Hammer and others predicting $100-per-barrel oil in 10 years.[6] The scarcity mentality that fed the price leaps of 1974 and 1979, plus a belief that unpredictable Middle Easterners control the world oil market through OPEC, gave such assumptions nearly axiomatic status during the past decade. But the exporting nations' boast that "oil in the ground is a better investment than money in the bank" is turning out to be so much wishful thinking.

The truth is that neither an end to the recession, nor OPEC's attempts at production quotas, nor continued wars in the Middle East will long be able to shore up a sagging crude-oil market. It is, indeed, because oil prices climbed so rapidly and so high in the 1970s that they are now almost certain to fall and keep falling—perhaps as steeply and as far as they rose. Today's prices are still higher than markets can tolerate, and the forces that led to the enormous price hikes of the past decade work just as effectively in reverse.

Table 1

Petroleum-Revenue Projections by the Alaska Department of Revenue
June 1982 vs. June 1981
(1982 constant dollars)

	Oil and Gas Revenue ($ millions)*		
	June 1981 Forecast	June 1982 Forecast	
Fiscal Year	"Expected Value"	"Expected Value"	"30-percent" Series
1983	4,030	2,654	2,399
1984	4,137	2,657	2,250
1985	4,271	2,623	2,177
1986	4,448	2,953	2,411
1987	4,713	3,305	2,644
1988	4,851	3,196	2,507
1989	4,983	3,365	2,595
1990	4,742	3,095	2,246
1991	4,544	2,714	1,862
1992	4,382	2,477	1,668
1993	3,979	2,285	1,427
1994	3,637	2,149	1,265
1995	3,144	1,826	1,059
1996	2,701	1,622	936
1997	2,289	1,608	908

*Includes royalties, production taxes, and corporate income taxes on petroleum products.

Source: Alaska Department of Revenue, *Petroleum Production Revenue Forecast, Quarterly Report*, June 1981, p. 13; Personal Communication, Charles Logsdon to Gregg K. Erickson, June 1982, p. 18.

While real (constant-dollar) crude-oil prices are unlikely to rise again to their 1980-81 levels any time in this century, forecasting prices for any specific future year is a nearly hopeless task. The fall in crude-oil prices that began last year will someday give way to another increase, and so on. As Table 2 and Figure 1 show us, crude oil markets are inherently *cyclical* and, except during a unique period of almost four decades when the State of Texas dominated both U.S. and world crude oil markets, oil price fluctuations have been large and frequent. *History shows us no long-term oil-price trends*, but only a series of cycles of uneven duration and amplitude. The era of OPEC's opportunistic price-gouging is over, but no other entity is in sight with the power to move oil prices in any consistent direction or to stabilize them at any given level.

Table 2

U.S. Crude-Oil Prices, 1870-1981
Current and Constant Dollars

	Crude-Oil Prices 1870-1972, Average U.S. Wellhead Prices; 1973-1981, U.S. Refiner-Acquisition Cost of Imported Crude Oil (Current Dollars per Barrel)	Price Deflator 1870-1925, Wholesale Price Index; 1925-1981, GNP Deflator		Crude-Oil Prices	
		(1972 = 100)	(March 1982 = 100)	(1972 = 100)	(March 1982 = 100)
1870	3.36	26.53	.129	12.67	25.97
1871	4.34	25.54	.125	16.99	34.83
1872	3.64	26.72	.130	13.62	27.92
1873	1.83	26.13	.127	7.00	14.36
1874	1.17	24.76	.121	4.73	9.69
1875	1.35	23.19	.113	5.82	11.94
1876	2.56	21.61	.105	11.84	24.28
1877	2.42	20.83	.102	22.62	23.82
1878	1.19	17.88	.087	6.66	13.64
1879	.86	17.68	.086	4.86	9.97
1880	.94	19.65	.096	4.78	9.81
1881	.91	20.24	.099	4.50	9.22
1882	.77	21.22	.104	3.63	7.44
1883	1.09	19.85	.097	5.49	11.26
1884	.83	18.27	.089	4.54	9.31
1885	.86	16.70	.081	5.15	10.56
1886	.70	16.11	.079	4.34	8.91
1887	.71	16.70	.081	4.25	8.71
1888	.88	16.90	.082	5.21	10.68
1889	.94	15.92	.078	5.91	12.11
1890	.87	16.18	.079	5.38	11.03
1891	.67	15.98	.078	4.19	8.59
1892	.56	15.33	.075	3.65	7.49
1893	.67	15.66	.076	4.28	8.77
1894	.80	14.68	.072	5.45	11.17
1895	1.23	14.49	.071	8.49	17.41
1896	1.10	14.10	.069	7.80	16.00
1897	.76	14.16	.069	5.37	11.00
1898	.91	14.55	.071	6.25	12.82
1899	1.29	15.07	.074	8.56	17.55
1900	1.37	15.79	.077	8.68	17.79
1901	1.14	15.66	.076	7.28	14.93
1902	1.09	16.18	.079	6.74	13.81
1903	1.24	16.37	.080	7.57	15.53
1904	1.18	16.56	.081	7.12	14.60
1905	.90	16.95	.083	5.31	10.88
1906	.85	17.34	.085	4.90	10.05
1907	.84	18.06	.088	4.65	9.54
1908	.81	17.93	.087	4.52	9.26
1909	.76	18.58	.091	4.09	8.39
1910	.67	19.10	.093	3.51	7.19
1911	.68	18.90	.092	3.60	7.37
1912	.65	19.68	.096	3.30	6.77
1913	1.15	19.55	.095	5.88	12.06
1914	.98	19.94	.097	4.91	10.07
1915	.79	20.85	.102	3.79	7.77
1916	1.42	23.39	.114	6.07	12.45
1917	2.07	29.04	.142	7.13	14.61
1918	2.64	32.68	.159	8.08	16.56
1919	2.79	37.29	.182	7.48	15.34
1920	4.30	42.48	.207	10.12	20.76
1921	2.21	35.40	.173	6.24	12.80
1922	2.10	32.55	.159	6.45	13.23
1923	1.68	33.32	.163	5.04	10.33
1924	1.81	33.26	.162	5.44	11.16
1925	2.19	33.71	.164	6.50	13.32
1926	2.41	33.19	.162	7.26	14.88
1927	1.72	32.48	.158	5.30	10.86
1928	1.68	33.00	.161	5.09	10.44
1929	1.78	32.87	.160	5.42	11.10
1930	1.62	31.80	.155	5.09	10.44
1931	.93	28.89	.141	3.22	6.60
1932	1.17	25.67	.125	4.56	9.34
1933	.92	25.14	.123	3.66	7.50
1934	1.36	27.32	.133	4.98	10.20
1935	1.31	27.83	.136	4.71	9.65
1936	1.45	28.01	.137	5.18	10.61
1937	1.58	29.34	.143	5.39	11.04
1938	1.46	28.66	.140	5.09	10.44
1939	1.32	28.48	.139	4.63	9.50
1940	1.32	29.13	.142	4.53	9.29
1941	1.48	31.34	.153	4.72	9.68
1942	1.53	34.39	.168	4.45	9.12
1943	1.54	36.18	.176	4.26	8.73
1944	1.56	37.03	.181	4.21	8.64
1945	1.58	37.92	.185	4.17	8.54
1946	1.82	43.95	.214	4.14	8.49
1947	2.50	49.70	.242	5.03	10.31
1948	3.39	53.13	.259	6.38	13.08
1949	3.30	52.59	.257	6.27	12.86
1950	3.31	53.64	.262	6.17	12.65
1951	3.34	57.27	.279	5.83	11.96
1952	3.34	58.00	.283	5.76	11.81
1953	3.55	58.88	.287	6.03	12.36
1954	3.68	59.69	.291	6.17	12.64
1955	3.67	60.98	.297	6.02	12.34
1956	3.71	62.90	.307	5.90	12.09
1957	3.89	65.02	.317	5.98	12.26
1958	4.09	66.06	.322	6.19	12.69
1959	4.00	67.52	.329	5.92	12.14
1960	3.87	68.67	.335	5.64	11.55
1961	3.87	69.29	.338	5.59	11.45
1962	3.89	70.55	.344	5.51	11.30
1963	3.88	71.59	.349	5.42	11.11
1964	3.87	72.71	.355	5.32	10.91
1965	3.89	74.32	.363	5.23	10.73
1966	3.88	76.76	.374	5.05	10.36
1967	3.90	79.02	.385	4.94	10.12
1968	3.93	82.57	.403	4.76	9.76
1969	4.15	86.72	.423	4.79	9.81
1970	4.29	91.36	.446	4.70	9.63
1971	4.56	96.02	.468	4.75	9.74
1972	4.57	100.00	.488	4.57	9.37
1973	5.38	105.80	.516	5.09	10.42
1974	12.52	116.02	.566	10.79	22.12
1975	13.93	127.15	.620	10.96	22.46
1976	13.48	122.71	.599	10.99	22.52
1977	14.53	141.70	.691	10.25	21.02
1978	14.57	152.05	.742	9.58	19.62
1979	21.67	165.46	.807	13.10	26.85
1980	33.89	177.36	.865	19.11	39.17
1981	36.80	193.58	.944	19.01	38.97

Market Control by the Texas Railroad Commission (1935-1972)[7]

To understand OPEC's helplessness in today's crude oil market, it is useful to review how the market operated before OPEC came to power, and how the Texas Railroad Commission (TRC) managed to exercise control for nearly 40 years.

The TRC's rule emerged in the mid-1930s from circumstances quite different from those that nurtured OPEC in the 1960s and 1970s. In the era between 1859, the year Colonel Drake first discovered oil in Pennsylvania, and the Great Depression, crude oil markets everywhere were dominated by events in the United States, where one black-gold rush after another unleashed an oversupply and sent prices plummeting.[8] Growing oil demand rapidly restored prices after most of these crises, as petroleum captured markets that were previously held by whale oil, gas, or coal, and as the automobile population swelled.

The Yates field in Texas, for example, was first tapped in 1926. It was the biggest field yet found, and over its first year of production, average crude oil prices in the United States fell 24 percent. Prices recovered quickly, but in 1930, the beginning of the Depression coincided with discovery of the even larger East Texas field. Oil literally ran in the creeks, and prices fell locally to 10 cents per barrel.

Much of this market chaos resulted from the common-law "rule of capture." The principle that nobody owned oil until it was brought to the surface generated frenzied competition among drillers to lift as much as oil as they could from each newly-discovered pool before their neighbors got it. The east Texas drilling rush ended in 1931 only when the governor sent the National Guard into the field to shut down production. The next year, a bitterly divided Texas legislature granted the TRC authority to limit output from individual wells in the interest of conservation and market order. Under "market-demand prorationing," refiners told the TRC how much oil they wanted to buy each month, and the Commission parceled out the "allowable" share of this demand to each well. This system assured every Texas producer a buyer for at least some of his oil, no matter how much excess producing capacity other producers held. The TRC's ability to stabilize the market was bolstered by market-demand prorationing in several other states including Louisiana, the number-two U.S. producer. Under state regulation, physical shortages and surpluses both became a thing of the past; "conservation" replaced physical waste, and the violent short-term fluctuations of crude oil prices ended.

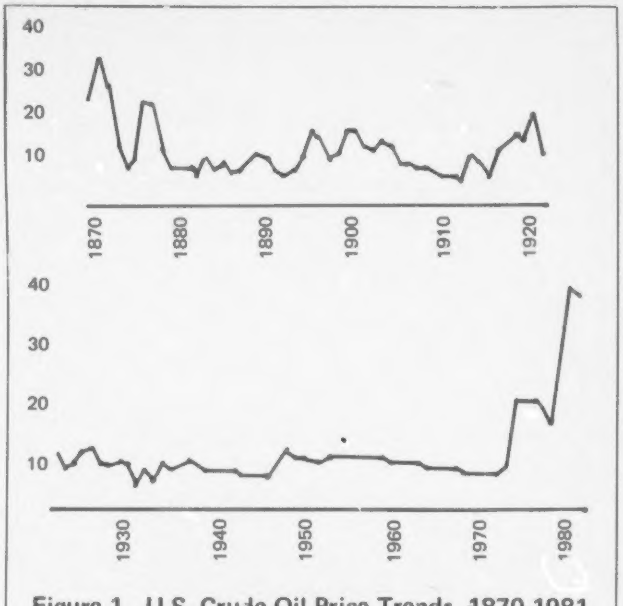

Figure 1. U.S. Crude Oil Price Trends, 1870-1981
(March 1982 constant dollars)

Even more important were a series of federal actions backstopping TRC authority. In the 1935 Connally "hot-oil" law, Congress made it a federal crime to ship oil produced in violation of state conservation orders. After World War II, the executive branch acted to prevent uncontrolled imports of low-cost foreign crude oil from undermining the states' control of U.S. oil supplies. For a while, the handful of largely U.S.-based oil companies that controlled the oil reserves of the Middle East and the Caribbean cooperated successfully in limiting petroleum production from their foreign concessions to just about the amount demanded by their own foreign refineries.

Nevertheless, by 1948, the huge low-cost oil reserves overseas had become enough of a threat to Texas regulation that the Truman administration started assigning "voluntary" import quotas to the companies. In 1958, after independents like Hunt and Occidental developed enormous new reserves in Libya, President Eisenhower established a mandatory oil-import program (MOIP). The MOIP gave each U.S. refiner the right to import some lower-priced foreign oil, but it enabled the TRC and other state conservation authorities to continue setting the total volume of crude oil supplied to the domestic market.[9]

Critics of market-demand prorationing and import quotas, including the 1970 Cabinet Task Force on Oil Import Control, headed by George Shultz, saw the combination mainly as an arrangement that kept U.S. prices artificially high and perpetuated wasteful excess capacity. It did, indeed, shut in much of the nation's lowest-cost oil, while creating an incentive to develop domestic fields that would not have been viable in a free market.[10] But precisely because it sheltered surplus producing capacity, Texas prorationing functioned as the balance wheel of the world oil market for four decades. Texas was the "price-maker"; the TRC determined the price all domestic producers received for their oil, and it was at the same time the most powerful single force in the world crude oil market. Other producers were relegated to the passive role of "price-takers" who could always sell as much or as little oil as they wished, once they accepted the price structure established by Texas.

The TRC could play the price-maker's role because it had control over sufficient spare producing capacity to supply refiners with all the Texas oil they wanted at the established price, offsetting any rise in demand prompted by boom conditions or long-term economic growth, or any drop in output by other producers at home or abroad. The Commission also had the power to enforce production cuts if necessary to prevent a surplus from appearing when oil demand waned or production outside Texas increased.

The Texas system worked nearly 40 years, through World War II, the U.S. recessions of the 1950s, and several supply disruptions caused by Middle Eastern political upheavals in the 1950s and 1960s. Oil supplies were seriously curtailed in 1952-54, for example, following Mossadeq's nationalization of the Iranian oil concessions; during the Suez crisis of 1956; and again during the 1967 Yom Kippur War. U.S. and world crude-oil prices remained relatively stable, however, as the majors produced more oil in the unaffected Persian Gulf countries, while the TRC and other state commissions increased production at home. From 1935 to 1972, roughly the period of the TRC's domination of the world market, the average annual change in real crude-oil prices in the United States was only 4 percent, plus or minus, a stark contrast to the average annual change of 21 percent between 1871 and 1935.[11]

One reason for the TRC's success was that it did not exploit its market power opportunistically. The 1952, 1956, and 1967 Middle Eastern conflicts offered Texas producers (and the state of Texas, a major royalty owner) a chance for huge short-run profits, as they did the big international oil companies. But each time, the TRC and the majors opted for long-term stability, forestalling the kind of consumer panic that generated the price run-ups of 1974 and 1979 after the TRC had lost control.

Once domestic production reached full capacity in 1972, the U.S. Government had no choice (politically, at least) other than to do away with import controls, leaving consumers exposed to whatever upheavals might occur in the oil-exporting countries. Meanwhile, nationalization of the major oil companies' overseas concessions, plus the growing influence of independents (including national oil companies like those of France, Italy, and Brazil), had stripped the majors of their ability to balance supply and demand outside of North America. A supply curtailment by the Arab oil producers, which would have hardly caused a ripple in oil prices 10 years or even 2 years earlier, transformed world energy markets and, for a few years at least, handed control of those markets to OPEC.

Panic Pricing in 1973-74 and 1979

OPEC's spectacular successes in the 1970s were due more to market psychology rather than to anyone's direct manipulation of crude oil supplies. OPEC *per se* did not engineer either of the decade's great price leaps; they came instead from *consumer panics* that spread through the spot market after the 1973-74 Arab embargo and the 1978 Iranian revolution. In both cases, OPEC merely voted, *after the panic had run its course*, to establish the prevailing spot prices as the base prices for all crude oil sales.

Crisis psychology was thus the key to the short-term oil market behavior that ratcheted prices upwards. The physical shortfall that provoked the panic of 1973-1974 was proportionally no greater than the shortfalls (or excess supplies) that the industry faced periodically because of unusual weather or the business cycle, and there was no reduction in output at all immediately before the 1979 price spiral. In neither case was the actual shortage greater than the sum of (1) the oil then being consumed by electrical-generating and manufacturing plants that had the capacity to use other fuels, (2) the standby or underutilized oil-producing capacity of U.S. and uninvolved foreign producers, and (3) the inventory cushions that industry ordinarily would have drawn down in order to prevent market turmoil.

The price leaps, rather, began both times with a handful of large-scale buyers who believed that the "shortage" was real, and who were thus willing to pay almost anything. The crisis mentality had a powerfully perverse effect on the market; instead of restraining demand, soaring spot prices gave the shortage credibility and helped propagate the panic to every class of consumer, so that demand actually increased. Much of the apparent supply deficiency was caused by hoarding, the most memorable example of which was the fashion of topping-off gasoline tanks daily in private automobiles. This practice alone probably created demand for an additional 600 million gallons of gasoline in the United States.[12]

However socially irrational that hoarding may have been, it seemed quite reasonable at the time from an individual company or consumer standpoint. In 1973-74, both the Arab producers and the Western media were insisting that the embargo and production cutbacks were in fact harming the consuming countries. Congress had passed an Emergency Petroleum Allocation Act; President Nixon had declared an "energy emergency" and had begun allocating crude oil and petroleum products.

No one knew how long the apparent shortage would last or how high prices might go before it was over; hence, it made sense for anyone with a preferred position in the allocation scheme to take every drop of price-controlled gasoline or fuel oil allowed under the rules, regardless of current need, and for every other consumer to buy as much at the prevailing price as he could store. Motorists, households, and businesses all sought to build up and maintain high inventories in case things "really got bad" later, while producers, refiners, and others expected to profit from holding products for resale at higher prices in the future. All of these anticipations, of course, validated themselves: supplies did get tighter and prices continued to rise.

The Role of Spot Prices[13]

Oil producers and refiners usually try to plan their physical operations and to budget their purchase outlays and revenues well in advance. For this reason, the great bulk of the world's crude oil moves in "captive" channels from producing companies to their own refinery affiliates or on relatively long-term contracts between producers and refiners. "Spot" transactions—sales of a single tanker-load or less—usually account for only a few percent of world supply, but they are an indispensable part of the total market because they allow any company or government to dispose of a temporary oversupply or fill a temporary shortfall. A general surplus or shortage equal to only (say) 3 percent of total world demand may thus show up as a surplus or shortage amounting to 50 or 100 percent of normal spot-market demand. As a result, spot prices tend to fluctuate daily and seasonally, and to range widely above and below "posted" or contract price levels, which typically change slowly and infrequently.

Changes in crude oil spot prices occasionally herald deep-seated market changes, but more often they are only exaggerated reflections of unexpected weather or business conditions, the buildup or drawdown of inventories, or political events. After some such contingency has caused a spot prices to diverge sharply from contract prices, the spot market normally returns to a relatively narrow band of prices in the vicinity of previous contract-price levels. What was special about the OPEC-dominated markets of the 1970s is that they twice failed to respond in this normal way. After the panics of 1973-74 and 1979, spot prices did *not* fall back to pre-crisis levels; instead, contract prices rose—by OPEC decree—to the peak values to which the panic had carried spot prices. This feat was OPEC's great triumph which, ironically, is now begetting its downfall.

The Power of Saudi Arabia and OPEC

The TRC determined prices by actively manipulating the aggregate supply of crude oil; as a state agency, it had the power to enforce its orders on the many thousands of Texas producers regardless of their conflicting individual interests and viewpoints. OPEC, on the other hand, has never had any authority over the diverse and sometimes warring sovereignties that make up its membership.

Nevertheless, in the early 1970s, once the surplus capacity of Texas and Louisiana had disappeared, Saudi Arabia by itself conceivably could have taken over the TRC's balance-wheel role. Its potential authority came from a combination of the world's largest reserves of conventional crude oil and a population on the order of only 5 million. The Saudis have thus had the same mix of assets, at least theoretically, that earlier gave the TRC its power—the ability to *increase or decrease* output over a wide range.

Proved and indicated reserves in Saudi Arabia number in the hundreds of billions of barrels—how many hundreds, no one knows or much cares, because it has never been worthwhile to carry out the intensive exploration and development work needed to get an accurate estimate.[14] The known reserves are, in any event, so large and so easy to develop that it would take Saudi Arabia only a few months to double its exports from the current level of less than 6 million barrels per day. (After all, production was almost 11 million barrels per day only one year ago.) With 2 or 3 years for drilling of development wells and construction of gathering lines and terminals, exports probably could rise to something like 18 million barrels per day. Indeed, before the 1973 embargo, the big oil companies (the Aramco shareholders) that controlled the Saudi concession were planning for production on the order of 20 million barrels per day by 1976.

Saudi market power rests on the ability to curtail as well as to increase production. The country's small population has permitted Saudi Arabia to reduce its output by almost half over the last year, from 10.6 million barrels per day in August 1981 to less than 5 million in November 1982, without suffering a fiscal or foreign-exchange crisis. Throughout the 1970s, therefore, Saudi Arabia, with or without the cooperation of other OPEC nations, had much of the wherewithal to stabilize the market in the same way as the Texas Railroad Commission once did.

The OPEC Mystique

It was a worldwide obsession with scarcity, rather than deliberate management of total world supplies, that underpinned the OPEC mystique and locked in the high prices OPEC decreed in 1974 and 1979 after the direct causes of panic had vanished. The doctrine of imminent resource exhaustion was embraced in the 1970s by a broad spectrum of parties who had entirely different world views and different ends.

Environmentalists hoped to slow the wasteful plundering of the earth's riches; oil companies were seeking to ward off price controls and attacks on their tax preferences; alternative-energy entrepreneurs sought business; politicians found in the energy crisis a moral equivalent of war; civil servants made it the rationale for massive expansion of their agencies and intervention into almost everything; and an army of academics, consultants, and journalists waxed rich and famous by studying, interpreting, or advocating national energy policies. Each group wanted to believe, or at least to persuade others, that "the wolf is really here"—that OPEC's prices might have risen too abruptly for comfort but that, in the last analysis, those prices only expressed the dictates of geological necessity.

"Oil in the Ground is Better than Money in the Bank"

In this intellectual climate, each price increase, regardless of its proximate cause, helped convince the oil-exporting nations that "oil in the ground is a better investment than money in the bank." This doctrine could remain valid for just as long as most producers believed in it, because it encouraged them to hold oil off the market in the faith that its value would be much higher in the future. It was therefore the most effective and durable weapon in OPEC's ideological arsenal.[15] Although the organization had no enforcement machinery, and did not even attempt a prorationing scheme until 1982, its members did reduce production when preservation of the price gains of 1974 and 1979 required it.

When the OPEC nations cut back their total exports in 1974 and again in 1979, it is important to note that they made the required cuts individually. They did so *without coordination or urging by OPEC*, because they had more money than they needed at the moment, and because they believed that their oil would be worth more later. Even the 1973-74 price rise had been so immense that most OPEC countries had substantial financial surpluses; only Algeria, Ecuador, and Indonesia were in deficit. In 1975, OPEC as a whole had a $59-billion (or 14-percent) surplus of export revenues over import expenditures. Several countries understandably concluded that their economies couldn't absorb further increases in oil income without generating intolerable inflation and social unrest.

It also seemed obvious to the producers that oil prices would continue to advance at a higher rate than their surplus cash would yield in risk-free financial instruments. Thus, Kuwait, Libya, and Venezuela together reduced their exports by 4 million barrels per day after the 1974 price rises. Saudi Arabia abandoned Aramco's 20 million barrel-per-day target in 1974, and cut production sharply in January 1979 and then again in April—ostensibly to offset an imminent oil glut, which was in fact an aftermath of the price panic that followed the overthrow of the Shah. In neither price rise did OPEC as such have any role in initiating or orchestrating the curtailments.

Thus, a short-lived belief in acute scarcity twice created a real scarcity that caused spot prices to soar. A belief that chronic energy shortages would engender a permanent seller's market then led producers and consumers alike to interpret an unusual and otherwise transitory market phenomenon as obedience to holy writ. The self-fulfilling doctrine that oil in the ground was the world's best investment not only encouraged OPEC officials to adopt spot market prices generated by consumer panic; it also enabled those prices to stick. In 1973-74, the world price of crude oil (measured at the Persian Gulf) increased fivefold in real terms, and then in 1979-80 it again tripled (a vivid contrast to the decades of tranquility under the TRC).

The End of the OPEC Era

OPEC's hold over world energy markets in the 1970s was no less real because it was mainly psychological. However, the cartel's mystique is far more fragile than the earlier market power of Texas, which stemmed from the TRC's direct control over production volumes. Today, few of the material requisites for further OPEC success remain. Its share of the world oil market has fallen from 55 percent in 1974 to 27 percent in October 1982, and Saudi Arabia's share is already less than the share Texas held as late as the mid-1960s.

Some recognition of these shifting realities began to strike the Saudi leadership only after two deliberate production cuts in 1979 had locked in a series of huge price increases voted by OPEC. Saudi Arabia's actions have now become more-or-less consistent with the professions of the kingdom's oil minister, Sheikh Yamani, who had long given lip-service to the cause of moderation and market order. Explicitly invoking the memory of the TRC, Yamani claims to have engineered the 1980-81 "oil glut"—increasing production from less than 8 million barrels per day to almost 11 million, specifically in order to bring prices down to $34 per barrel and to persuade his OPEC partners that they should join a prorationing scheme under Saudi leadership. In 1982, after succeeding too well, perhaps, the Saudis have abruptly reversed course, now *cutting* their exports by over half in an attempt to support the $34 price.

But Saudi Arabia appears to have been too late in discovering the market power it alone possessed. While the TRC held crude oil prices in the United States above short-term free-market levels, it still kept them low enough to encourage ever-increasing oil consumption and stave off the development of alternative energy sources. The Saudis, however, wittingly or unwittingly had a key role in both OPEC price hikes of the 1970s, unleashing inexorable and profound reactions from both producers and consumers, which today threatens to make OPEC oil a dispensable commodity.

Contrary to a near-consensus of industry, government, and the academic/consulting community during the 1970s, crude oil demand does respond—slowly but massively—to price changes. In the long run, higher prices have a profound effect on oil supply too, but the relationship is too complex to pursue in detail here. In any event, non-OPEC output has grown rapidly and will continue to grow: production from the North Sea, Alaska, and Mexico, for example, increased by 4 million barrels per day between 1977 and early 1982, and Mexico's exports—driven now by economic necessity—could increase another 3, 5, or more millions of barrels per day before 1990. Most clearly and most importantly, however, high oil prices are shrinking oil demand both by reducing total energy consumption and by making coal, natural gas, nuclear power, and other energy sources more attractive.

The Flight from Oil

After a modest dip in 1974, total world oil consumption resumed its growth, and finally turned down only 1979. This experience reinforced the impression that oil demand was insensitive to price changes, misleading economists as well as industry executives and government officials in both oil-producing and oil-consuming countries. An absolute decline in U.S. oil consumption was first visible in 1979; the rest of the industrialized world followed a year later. In retrospect, it is remarkable how many were unable to see what was happening.

Exxon in 1977 forecast that U.S. consumption of petroleum liquids would be *20.3 million barrels per day in 1980*. In 1979, Shell predicted *18.6* million barrels per day consumption in 1980, and both the *Oil and Gas Journal* and the Independent Petroleum Association of America (IPAA) forecast 18.4 million. As late as mid-1980, Shell had only revised its published estimate downwards to *17.2* million barrels per day, while the IPAA had come down to *17.4*. *At year-end in 1980, however, average consumption for the year stood at only 16.3 million barrels per day*.[16]

The drop in total oil use over the last 3 years and the experts' tardiness in recognizing the trend of consumption stems from profound changes in the structure of world energy demand that have actually been under way since 1974. From 1960 to 1973, oil prices were low and declining in real terms. As a result, absolute oil consumption in the industrialized countries grew at an annual rate of 7.6 percent. Japan led this growth with an 18-percent average over the 13-year period. After 1974, however, the quadrupled crude oil price led to a gradual leveling off of demand for oil everywhere. Total oil consumption in the industrialized countries dropped slightly in 1974-75; growth resumed between 1975 and 1979 at an annual rate of about 1 percent, but this partial recovery only concealed the fundamental shift that had taken place in the world's energy-use patterns.

More telling than gross consumption figures is the change in oil use per unit of economic activity, or "gross domestic product"—the oil/GDP ratio. After rising at an annual rate of 1.3 percent from 1960 to 1973, the oil/GDP ratio for the major industrialized countries showed a 1.5-percent annual *decline* between 1973 and 1979. The 1979 upheaval initiated an even more decisive and long-lasting shift away from oil, reflecting both an immediate reaction to the second OPEC price surge and the delayed but cumulating response to the price increases of the early

1970s. From 1979 to 1981, oil consumption in the industrialized countries fell 7 percent per year, and the oil/GDP ratio fell at an annual rate of 8 percent.

Since the latter measure represents the amount of oil used *per unit of economic activity* rather than an absolute figure, its fall implies that an end to the present recession will not be the panacea that much of the energy industry and many analysts still seem to anticipate. The die has been cast. It is unlikely that individual homeowners will tear the insulation out of their houses if the price or home heating oil drops, or scrap their new fuel-efficient automobiles in response to lower real prices for gasoline. Nor will the housing construction and automobile industries abandon their new energy-efficient designs. Those who attribute the oil glut and the current "softness" of oil markets primarily to the world recession forget that economic recovery will mean a *more rapid replacement* of existing vehicles, industrial machinery, and buildings with models designed since 1974 in response to high energy prices.

Except in a couple of OPEC countries, no new base-load electrical generating plants fired by oil, or any large-scale oil-fired boilers of any sort, have been built since the mid-1970s; over the past decade, industry has been relentlessly converting existing oil-burning equipment to coal, natural gas, and other energy sources. Because changes in the world's fuel-use patterns are generally embodied in long-lived capital-intensive investments such as buildings, transportation equipment, and industrial machinery, the extended period it has taken for the 1974 price rises to produce an absolute decline in oil consumption only reflect the time required to replace these assets. This long lag in adjusting the world's capital stock to changed energy-supply conditions also suggests that the all-time high oil prices of 1974-1982 will influence consumption patterns for many more years, *even if world oil prices now fall as rapidly and as far as they rose in the 1970s.*

The truism that the world's petroleum resource is finite thus does not mean that oil prices will continue to rise. The world has no demand for crude oil as such, but only for the heat, motive power, and chemical building blocks it provides, and only for so long as it is the cheapest source of these goods. No matter how scarce natural petroleum liquids become, their prices cannot rise and remain above the cost at which each of these wants can be dispensed with or served in some other way.

It should be fairly obvious now that predictions of $100 per barrel oil are ludicrous. At $15 per barrel, oil was already more expensive than coal everywhere in the world, and had consequently priced itself out of electrical-generation and other large-scale stationary-heat and boiler-fuel markets. At well under $50 per barrel, given a few years for market and infrastructure development, liquid petroleum products would have become marginal even as transportation fuels, increasingly replaced by some combination of compressed and liquefied hydrocarbon gases and alcohols. A world that is already fleeing from oil at $32 per barrel would hardly have any use for it at two or three times that price.

This dynamic does not bode well for OPEC, or for the ability of Saudi Arabia or anyone else to manipulate or stabilize the market. Only when demand falls is the power of a price-maker tested. Can the OPEC nations, many of whom are deeply in debt, now afford to cut back production as they must?

On this point too, the OPEC of 1982 is as different from its predecessor, the Texas Railroad Commission, as it is from the OPEC of the mid-1970s. In comparing OPEC with the TRC, it is essential to remember that the Commission's power developed during the Depression, and that its institutions were designed expressly to manage a chronic excess of producing capacity. Once that excess was gone, the TRC became impotent and economically irrelevant. OPEC, in contrast, showed its muscle under totally opposite conditions. It twice seized upon a brief moment of consumer panic, convinced itself and consumers alike that a permanent world oil scarcity existed, and for a while reaped the benefits of a seller's market even after the foundations of that market had vanished.

There is little prospect that OPEC can function effectively in a chronic buyer's market, especially in the face of the organization's current internal dissensions and the precarious financial situation of its members. At its March 1982 meeting, the group made its first serious attempts at TRC-style prorationing. The experiment was an instant failure, with at least three members brazenly exceeding their quotas from the beginning.[17] By July 1982, Iran was selling 1.0 million barrels per day above its quota, Nigeria .3 million, and Libya .25 million. Venezuela—the sole advocate of OPEC prorationing before 1980—had threatened to start selling more than its assigned 1.5 million barrels per day if the other countries didn't get in line. In August, the Saudis, who had already reduced their own output by 45 percent in the hope of supporting the $34 marker price, were also hinting that they would raise their own output if the cheating did not stop.[18]

Even holding the line at today's production level is not enough to bolster OPEC's flagging power, as world oil consumption continues to shrink and the production of nonmembers—especially Mexico—continues to grow. The organization as a whole must somehow manage to reduce production even further if present prices are to hold. Yet its member-nations individually face internal problems and pressures that urge them in just the opposite direction.

The greatest source of downward pressure on prices is the shaky financial condition of the exporting countries, a drastic turn-around from the situation of 1975. Since 1973, OPEC spending for imports has risen at an average annual rate of 30 percent, because of ambitious industrialization plans in every one of them and extravagant purchases of military hardware in many. Already, the combination of declining oil demand and rapidly rising expenditures has resulted in trade deficits for all but three OPEC members. Unless oil production or prices increase sharply, every member, including Saudi Arabia, could slip into deficit by the end of 1982.

These deficits, exacerbated by the continuing Iran-Iraqi war, are already beginning to take their toll as the most hard-pressed countries, in search of revenues to pay for today's imports, produce as much oil as they can sell. Moreover, with declining or even stable prices and real (inflation-adjusted) interest rates at their highest level in history, the slogan that oil in the ground is a better investment than money in the bank is obsolete even for countries that do not have an immediate cash-flow or foreign-exchange deficit. In the 1980s, it is hard for even a cash-surplus oil-exporter to avoid recognizing that *oil in the ground is a non-earning asset*, which ought to be cashed out so the proceeds can be invested in high-yielding financial instruments. This doctrine is just as true and may be just as self-fulfilling today as was the opposite notion in 1975 or 1979.

To put OPEC's weakness into further perspective, consider the following:

- In August 1982, world crude oil production was about 54 million barrels per day. Out of this total, the Saudi share was about 5.5 million, or 10 percent; all of OPEC was producing about 17 million barrels per day, or 31 percent of world supply. If new production in non-OPEC countries plus further declines in consumption were to equal only 10 percent of present world demand, OPEC's members would have to reduce their own production by 32 percent in order to defend any chosen price level.

  Saudi Arabia, which has already reduced its exports by 45 percent over the last year, cannot and will not accommodate much of this burden, as a 10-percent shift in world supply or demand would be just about equal to the country's current export volume. Further growth in non-OPEC production and a further fall in world consumption are not only plausible but nearly inevitable. Thus, Saudi Arabia's reign as world price-maker is ending virtually as soon as it began.

- Conservation, fuel-switching, and recession caused the noncommunist world's oil consumption to fall by 7.5 million barrels per day between 1979 and mid-1982. If consumption declined by only half as much over the next 2 years, OPEC's output would have to fall by an amount equal to the combined production of Kuwait, Libya, Algeria, and Indonesia in August 1982, or by 68 percent of current Saudi output.
- Crude oil production from Alaska, Mexico, and the North Sea increased by more than 4 million barrels per day between 1977 and 1981. If all non-OPEC producers were to increase their output by another 4 million, OPEC could maintain control of prices only if its members could cut production by at least the equivalent of 73 percent of the August 1982 Saudi Arabian production.
- Production from Iran, the world's former number-two oil exporter, has fallen 4 million barrels per day from its 1974 peak. The former number-three exporter, Iraq, is producing 2.6 million barrels per day less than its 1978 peak it reached in 1978. If the war between these countries should end and they returned to the market with their 1978 sales volumes, other OPEC countries would have to curtail production by an amount equal to 90 percent of the August 1982 Saudi output.
- Finally, if by chance the last three developments all took place, and if OPEC hoped to sustain world prices at current levels, it would have to find places to cut production by at least 12.7 million barrels per day—75 percent of the organization's current output, or 231 percent of August 1982 Saudi production.

The range of conditions within which OPEC, Saudi Arabia, or anyone can continue to dictate or even defend the level of world oil prices is thus extremely narrow. The reckless opportunism that held sway in the 1970s is now taking its toll. Long-term changes in supply and demand adverse to OPEC's interests have been under way ever since the cartel's first big coup in 1974. As these changes become visible to everybody, the mystique that has been OPEC's chief source of power will vanish along with forecasts of hundred-dollar oil. The world market will soon be, if it is not already, out of anyone's control.

What Have We Learned?

A big new disturbance in world oil markets could push prices either up or down. It is still conceivable, if only barely so, that a sharp economic upturn and an exceptionally cold winter could combine with the right kind of Middle Eastern political crisis and send prices soaring for a third time to levels significantly above those reached in 1980-81.

The probabilities, however, weigh heavily on the other side. There is a huge overhang of excess producing capacity in the oil-exporting countries. Several of them are in extreme fiscal distress; Mexico in particular has both the ability and a desperate need to increase oil exports. Meanwhile, the price-induced flight from oil is still gathering a momentum that will not be spent for years, *no matter what happens to oil prices today.*

All of these forces together, not to mention a worldwide economic slump that is far from over, add up to irresistible downward pressure on oil prices. Prices must *eventually* go down, and they must go down substantially. The serious questions are whether they will descend smoothly or chaotically, and how deep they will go. There is still a sliver of a chance that prices could firm for weeks or months, or even—given the unlikely coincidence of events described above—increase once more. But an oil market collapse this year or next has a far bigger likelihood—a collapse every bit as spectacular as the two price eruptions of the 1970s.

Looking back across the years of OPEC and energy crises to the relative tranquility of the TRC era and beyond, there are several lessons for the future.

1. **Worldwide scarcity and rising real resource costs had little or no direct responsibility for the energy price upheavals of the 1970s**

The earth's *known* resources still include plenty of crude oil that could be developed and produced at resource costs (capital, material, and labor costs) well below 1973 real prices. Considering these resources alone, there is enough low-cost oil left to satisfy the world's current rate of consumption for several decades.

2. **In the absence of an effective price-maker like the Texas Railroad Commission, crude-oil markets are inherently cyclical.**

Oil demand is highly responsive ("elastic") to price changes, but this response is very slow, because fuel-use patterns are embodied in capital goods whose turnover is measured in decades: buildings, transportation equipment, industrial machinery, and production processes. For the same reason, demand is exceedingly inelastic to price changes in the short run. This contrast between short- and long-term price-responsiveness inevitably fosters cyclical price behavior. In the 1970s, *short-term price-inelasticity* spawned a steep cyclical upswing after years of artificially-maintained stability, and in 1981, a high *long-term price-elasticity* finally began to show itself in the beginning of a downswing.

If there is no "surge-tank" or "damping" mechanism comparable to market-demand prorationing, moreover—

3. **Market structure and psychology can exaggerate an episodic oil-price fluctuation, up or down, far out of proportion to the original supply-demand imbalance that triggered it.**

Inventory accumulation or liquidation, the financial position of major producers, and consumer panic can all cause markets to behave perversely over a "short-run" that can last for several years. In a mockery of the "normal" supply-demand map, an oil-price rise can for a while create an incentive to build inventories, and sustained price rises can encourage the withholding of production. A price reduction, likewise, can provoke liquidation of inventories and the expansion of output. As a result—

4. **A small excess of demand or supply, real or imagined, can send the market soaring or plummeting far beyond the price level that ultimately could have brought it back into balance.**

Thus, there is no *stable* equilibrium toward which an unregulated petroleum market unfailingly "hunts" once it is disturbed. The upheavals of the 1970s, which carried prices well *above* any level that could be long sustained, have now set the stage for a descent far *below* the range of sustainable prices.

5. **No cartel or regulatory system could have held world oil prices at the low levels of the early 1970s, and none can do so in the future.**

Before 1973, state regulators in the United States and the cartel of international companies maintained prices that were above the shortest-term "market-clearing" levels, but which were still so low that oil totally dominated transportation-fuel markets (even capturing railroads that had earlier been powered by electricity generated from coal). Except in a small corner of the United States, these low oil prices virtually swept coal from the world's markets for industrial boiler fuels and organic-chemical feedstocks. At the same time, however, the prices were too low to perpetuate the surplus oil-producing capacity in the United States, to which the state regulators owed their market power. Though the world's stock of very low-cost oil was still immense, the loss of spare capacity in the United States concentrated the power to rapidly increase or curtail production in a handful of economically underdeveloped and politically turbulent countries.

The problem, therefore, was not a permanent worldwide scarcity of "cheap" oil. Instead, it was the absence of short-term oil–demand flexibility, together with the disappearance of the short-run supply flexibility that had previously been exercised by governmental and private institutions consciously striving for market order. In these circumstances, a relatively small curtailment of sales by a few producers openly aiming at market disruption could and did trigger an upward explosion of prices. If world oil prices now fell to pre-1973 levels (in constant-dollar terms) once more, a world-wide "energy crisis" would be with us again sooner or later. Likewise, however—

6. **No group of producers could long hold world oil prices at the high levels of the early 1980s, and it is unlikely anyone will ever be able to do so.**

Today's prices area not viable, because they are well on the way to pricing oil out of both the industrial fuels market and the market for petrochemical feedstocks. If prolonged, today's prices would even begin to erode oil's monopoly in transportation-fuels markets. Oil at $30 and up has, therefore, guaranteed the emergence of excess producing capacity not in just one or a handful of political entities (Texas and Lousiana, for example, or Saudi Arabia, Kuwait, and Abu Dhabi), but all over the globe.

7. **Market stability at any price requires the supply-demand balance to respond promptly and in the normal direction to any price change, and requires and requires prices to respond promptly and in the normal direction to any change in the supply-demand balance.**

If the world is to avoid repeated violent swings in oil prices, market arrangements must be such that a small rise in oil prices can cause either a sizable *increase in effective oil supply or a sizable decrease in oil consumption*, or both. A small drop in prices must, likewise, be able to induce a prompt reduction in supply or increase in consumption.

8. **Short-term supply-side adjustments that foster price stability rather than instability require a TRC-style price-maker, but none is now in sight.**

Any supplier or group of suppliers that hopes to regulate the market must have the ability and the will to swing world oil production upward to satisfy any surge of demand or supply interruption, or (more importantly now) to swing it downward in order to make room for a surge of supply or slump in demand. The system run by the TRC, through *underpricing*, destroyed its power to increase output whenever it was needed. OPEC as such never had *either* the will or the capacity to take responsibility, and Saudi Arabia—out of greed or timidity, we may never know—blew its chance. It has now, through *overpricing*, destroyed its ability to reduce production sufficiently to support world prices at present levels or, most likely, at any level.

The only plausible new candidates for price-maker may be PEMEX (Mexico's state oil company) and the U.S. Strategic Petroleum Reserve. However, even if one of them maneuvers itself into the right strategic spot in the world market, there is only the barest chance that domestic politics in the United States or Mexico would permit either institution to move quickly, independently, and responsibly enough to serve as the world's oil-supply balance wheel.

9. **The only price level that even a supply-side price-maker can maintain for long is one that fosters demand-side stability as well.**

10. **Specifically, the range of sustainable oil prices is limited to those prices at which oil, coal, and gas are effective and close competitors in the world's markets for electrical-generation fuels, industrial boiler and stationary heating fuels, and petrochemical feedstocks.**

If the price of oil remains within a range where oil, natural gas, and coal effectively compete for industrial sales in North America, Europe, and East Asia, many of the world's large energy consumers will find it worthwhile to install dual or multi-fuel capacity, expressly in order to take advantage of small shifts in relative prices. The ability of a large consuming sector to switch fuels rapidly in response to changes in relative fuel prices or availability would preempt the perverse market behavior that has permitted small market shocks to explode into global crises. Multi-fuel consumers would simply let go of enough oil in a tight market, and absorb enough additional oil in a slack market, to avoid even the *illusion* of a physical shortage or surplus. The greater this demand-side flexibility becomes, the more modest will be the world's need for a supply side price-maker like the TRC, the less onerous will be the price-maker's task if one is still needed, and the less damage an incompetent or irresponsible price-maker will be able to cause.

11. The most stable and easily sustainable price range is probably on the order of $10 to $18 per barrel (in 1982 constant dollars), delivered to the world's major consuming regions.

Unlike pre-1973 prices, the $10-to-$18 price range is high enough to cover the cost of mining and transporting coal, *and burning it in an environmentally acceptable fashion*, almost but not quite everywhere in the world. These prices are also high enough to justify shipping liquefied natural gas (LNG) from any low-cost gas-producing area near tidewater to almost any port in the world, and to justify building transcontinental natural-gas pipelines (though maybe not the Alaska or Yamal pipelines). Prices in this range would still leave oil holding a significant fraction of the markets for electric-utility and industrial boiler fuels and for petrochemical feedstocks. Any price excursion outside of this range, however, would still carry the threat of prices sharply fluctuating farther away from, or substantially overshooting, any attainable equilibrium.

History offers some empirical support for the viability of a long-term world oil price in the $10-to-$18 range. Over 110 years of crude-oil price records in the United States, the average price in 1982 dollars has been almost exactly $13 per barrel and, despite an average constant-dollar price fluctuation of more than 20 percent per year, no long-term trend can be detected. (The average 1982-dollar price between 1871 and 1925 was $12.96 per barrel, and the average price between 1926 and 1980 was $13.04 per barrel.) Thus, the *safest* guess as to the *average* crude-oil price over (say) the next 25 years may be about $13 per barrel in 1982 dollars. However—

12. These generalizations do not warrant a forecast of a $13 price, or any other specific price at any specific future time.

In the absence of a secure mechanism for getting world oil prices into this range and keeping them there for several years, and in the absence of a competent and responsible successor to the Texas Railroad Commission, the prospect is for wide and unforeseeable fluctuations in world oil prices like those that occurred before the TRC took control in the mid-1930s. The managing director of Royal Dutch Shell, D. deBruyne, summarized the new outlook well when he wrote that "we are in for a period of severe and unpredictable discontinuities."[19] The most ambitious forecast we dare make with any confidence is that—without some new market-ordering mechanism, which is not now in sight—

13. World oil prices will fluctuate both randomly and cyclically. In any given future year, however, the most likely price will be far below 1979-1982 levels.

In summary, there is no basis in geology, resource-economics, or history for predicting a never-ending increase in the real price of oil. Private investments and governmental institutions founded on that proposition are sure losers.

NOTES

[1] None of the several recent price forecasts I have seen, prepared for *internal* use by major petroleum producers (corporations or governments), expects sustained growth in the real price of oil during the rest of this century. All of them now assume continued constant-dollar price declines through at least 1985. At least two major integrated oil companies that now assume for their own planning purposes that the long-term oil price trend will fall somewhere *between a level nominal-dollar and a level constant-dollar trajectory*, released *public* forecasts in 1982 that still show long-term real-price increases for oil.

More significant than what the companies are saying, however, is what they are doing.

The dramatic change in industry's long-term oil price expectations over the last 2 years is impossible to ignore: the companies have scuttled every major unsubsidized synthetic-fuels project in North America, and most of the subsidized ones to boot. Oil companies are cutting back massively on drilling programs, but the most telling indicator of the drastic change in their expectations is the fact that *they are now paying only about half as much per barrel for proved petroleum reserves* as they were paying in late 1980. (On the last point, see B.F. Picchi, "The Valuation of U.S. Petroleum Reserves: Exploding the Myths" in Salomon Brothers, Inc. Stock Research/Industry Analysis, October 15, 1982.)

The change in the energy market did not take everyone by surprise. For early warnings in Alaska or from Alaskans about the impending turndown in oil prices and state revenues, see my remarks in the minutes of the U.S. Department of Commerce Economic Advisory Board during 1979 and 1980; also A.R. Tussing, "The 1981 Oil Price Outlook" in *The Economic Outlook for 1981*, University of Michigan, November 1980; A.R. Tussing, "Will Oil Prices Keep Rising? Maybe Not," *Anchorage Daily News*, February 14, 1981; Jon Matthews, "State Revenues Likely Will Drop: Oil Prices are Heading Down," *Anchorage Daily News*, May 29, 1981; A.R. Tussing, "Alpetco's Collapse Has Lessons for Budget Planners," *Anchorage Daily News*, May 23, 1981; Bob Shallit, "State Faces Revenue Loss, Economists Say," *Anchorage Daily News*, January 15, 1982; "Alaska Cuts Forecasts," January 18, 1982; Erickson & Associates for the Alaska State Legislature, *The World Oil Market and Alaska State Revenues: A Fifteen-Month Forecast* (Juneau: March 1982).

[2] Alaska Department of Revenue, Division of Petroleum Revenue, *Petroleum Production Revenue Forecast*: (Quarterly, Anchorage: June 1980 through September 1982). In June 1982 the Department of Revenue's oil price forecasts were revised slightly upward. In September, however, the Department issued a forecast which in the long term is even more pessimistic regarding state oil revenues than the March report.

[3] Alaska Department of Revenue, Division of Petroleum Revenue, *Petroleum Production Revenue Forecast*, March 1982, p. 5.

[4] Charles Logsdon, Chief Petroleum Economist, Alaska Department of Revenue, personal communication to G.K. Erickson, July 18, 1982. When the Department of Revenue reduced the figures in each of the series of forecasts that corresponded to a specific confidence level, greater attention to the uncertainty of petroleum price forecasts led the department to emphasize its "30-percent" rather than its "50-percent" series. The different percentage figures indicate the Department's judgment about the probability that actual revenues will be *less* than the figure shown.

[5] " 'OPEC Will Survive,' Oilman Hammer says." Associated Press story in *Seattle Post-Intelligencer*, July 12, 1982, p. B8.

[6] Acres American, Inc. (the principal contractor on the feasibility study for the Susitna River hydroelectric project) offered the following list of "major forecasts of oil price trends" in order to refute forecasts of declining oil prices in another ISER report (A.R. Tussing and G.K. Erickson, *Alaska Energy Planning Studies: A review of three consultant studies submitted to Alaska state agencies in fiscal-year 1982*. Anchorage: ISER. Final report November 1, 1982):

Source	Date of Forecast	Forecast Trend (%)
Data Resources, Inc.	Summer 1982	+2.8
Int'nl Energy Agency	Spring 1982	—0.5 to + 2.0
U.S. DOE Energy Info Adm.	Spring 1982	above + 3.0
Canada: Energy Mines & Res.	Summer 1982	+ 1.7
Ontario Hydro	Spring 1982	+ 1.8
Energy Modeling Forum Avg. of ten models	February 1982	+ 1.9 to + 5.3
Dr. F. Fesharaki	Spring 1982	+ 1.7

> From Alaska Power Authority, *Susitna Hydroelectric Project*, "Commentary on 'Alaska Energy Planning Studies' (A.R. Tussing and G.K. Erickson)," prepared by Acres American, Inc., September 7, 1982.

While the Acres compilation does not reveal the time span of the projections cited, it is representative of the kind of forecasting institutions that Acres polled, even in late 1982. Significantly, however, this list does not contain a single petroleum-producing company, financial institution, or agency of an oil-*exporting* political entity (see note 1), while four (half) of the forecasts cited come from governmental entities that have a powerful institutional stake (as does the Alaska Power Authority) in perpetuating the belief that real oil prices will continue to rise.

The published forecasts of government agencies and the big consulting firms indeed seem to be among the last to recognize the changed outlook, just as they were among the last to recognize that the high prices established in 1973-74 would be with us for a while.

[7] For the history of oil conservation and the rise of the Texas Railroad Commission, see Wallace F. Lovejoy and Paul T. Homan, *Economic Aspects of Oil Conservation regulation*, (Baltimore: The Johns Hopkins University Press, 1967), pp. 33-57, and Stephen L. McDonald, *Petroleum Conservation in the United States: An Economic Analysis* (Baltimore: The Johns Hopkins University Press, 1971), pp. 29-55.

[8] From the July 1882 *Scientific American*:

> The history of the discoveries in the Pennsylvania oil fields has been one of a series of disappointments to the producers. From 1866 to 1872 the price per barrel averaged from $4 to $5, and the producers were making money rapidly. Then the field in Butler County was struck, and from that day to this the production has been greater than the consumption. Then came the Bullion pool with its 2,000- and 3,000-barrel wells, which forced the price down to $1.50. This field was soon exhausted, and better times for the producers were at hand when the Bradford field, the largest in extent ever known, was opened. Then Bradford began to decline and again a silver lining was seen, but again disappointment came.
>
> In May of last year the first well was struck in Allegany County, New York, and a new field was opened that soon more than made up for the decline. Then was the great "646" well struck, and with it followed disaster to the owners of wells generally, and lower-priced oil than since the summer of 1874, when for a time it sold for 45 cents a barrel. Where the next field will be is only a matter of conjecture.

[9] For the history of import controls, including the influence of the Texas Railroad Commission on import policy, see M.A. Adelman, *The World Petroleum Market* (Baltimore: The Johns Hopkins University Press, 1972), pp. 150-154.

[10] Lovejoy and Homan, *Economic Aspects . . .*, pp. 265-285, and the Cabinet Task Force on Oil Import Control, *The Oil Import Question* (Washington: U.S. Government Printing Office, 1970), pp. 24, 121, 216, 242-246.

[11] Adelman, . . . *World Petroleum . . .* For a history of oil prices during the entire era, see pp. 131-191.

[12] M.A. Adelman, "Coping with Supply Insecurity," *The Energy Journal*, October 1982, pp. 1-16.

[13] On the role and operation of spot markets, see Paul H. Frankel, *Topical Problems* (London: Petroleum Economics, Ltd.), July/August 1973, p. xx; January/ February 1976, p. iv; and June 1979, pp. xvii-xviii.

[14] Estimated proved reserves as of January 1, 1982, can be found in Robert J. Enright, "Worldwide Report," *Oil and Gas Journal*, December 28, 1981, p. 86. The *Journal* lists Saudi Arabia's proved reserves as 164.6 billion. John Blair in *The Control of Oil* (New York: Vantage, 1978), pp. 18-19, quotes Yamani as saying that "Saudi Arabia's 'true reserves' are more than two and a half times the 'ultra conservative numbers' at which 'proved reserves' were being carried."

In 1972, James Akins, then U.S. Ambassador to Saudi Arabia, told Senator Mike Gravel and me that Saudi Arabia's reserves were "realistically" at least 700 billion barrels and "probably closer to a trillion." At a Central Intelligence Agency briefing I attended in 1975, an Agency spokesman gave almost the same estimates (likely from a common source) of the ultimate reserves in the known fields in Saudi Arabia. He added that Iraq's reserves were probably "almost as big."

For our present purposes it doesn't matter which of these reserve estimates is the most realistic; even the most conservative of them implies that Saudi Arabia is physically capable of producing considerably more than 20 million barrels per day without any new discoveries.

[15] See, for example, the remarks of Jahangir Amuzegar, Iranian Ambassador-at-Large and sometime petroleum minister, at a 1975 Salomon Brothers conference in London (World Petroleum: The Economics of Current Pricing and Supply Policies. London: Salbro Press, 1976, p. 30):

> Notwithstanding Western calculations and projections to the contrary, OPEC members believe that their oil reserves underground will be worth more in the future compared to the present—even with accumulated returns on the invested revenues.

Adelman makes a plausible case that this notion is economically fallacious and, by implication, cynical and deliberately misleading (M.A. Adelman, "OPEC as a Cartel" in Griffin and Teece, *OPEC Behavior and World Oil Prices*, pp. 38-53).

However, Adelman's argument that oil reserves *never* earned as much as financial investments rests on discount rates that reflect the short life expectancies of Third World governments. This approach ignores the *ideological* content of national policy. Economic policy in most OPEC nations is either made by nationalist bureaucrats who view their nations as something *different from* the present government, or by heads of state who believe that their persons are *identical with* the nation, which is itself immortal. Either case results in lower discount rates and longer amortization periods than Adelman assumes for a non-ideological world.

Adelman's analysis also virtually dismisses the *specific* ideological role played by the concept of oil reserves as a long-term investment. OPEC spokesmen were doubtless sincere when they insisted that the asset-value of their resources was appreciating at a higher rate than the real rate of return on risk-free financial investments. My ground for accepting such professions at face value stems both from personal contact with high-placed and lowly believers, and the fact that it was in the oil exporters' interest that they and their customers both believe their motives were something more honorable than greed and their production scheduling built on something more substantial than simple opportunism.

My remarks at the same 1975 conference (A.R. Tussing, discussant, comments on speeches by Chief M.O. Feyide, Secretary-General of OPEC; Amuzegar; T.O. Enders, U.S. Assistant Secretary of State for Economic Affairs; Adelman; and P.T. Frankel, Director of Petroleum Economics, Ltd., *Topical Problems*, pp. 41-44) directly addressed Amuzegar's 1975 argument and anticipated Adelman's 1981 argument:

> To Karl Marx, who gave us the concept, "ideology" was a body of doctrine that provided a religious, moral, or scientific cloak to self-interest. Ideology is in the first place a political weapon: if they believe in it, its sponsors can draw from it moral fervor and confidence of success. And an effective ideology can also captivate or neutralize its adversaries. Believing one's own propaganda uncritically (or that of one's opponents) has, however, led to some remarkable foolishness, as various crusades from the Middle Ages to Vietnam have shown.
>
> I suppose that my message today is not to take OPEC's rhetoric too seriously, nor the opposing rhetoric. . . . The conservationist element in OPEC doctrine deserves more serious attention (than its profession of solidarity with the poor and exploited everywhere), particularly as it is a notion shared by a rich, industrialized non-OPEC oil producer like Canada and by a variety of environmentalists and Malthusian doomsayers in all of the rich countries. The common theme of all these parties is that mankind ought to keep its cheapest energy source, petroleum, in the ground because it will be more valuable in the future than it is today.
>
> This proposition cannot be dismissed out of hand. There may well be *some* producing country or countries with reserves of only ten to fifteen times current production, without the hope of major new discoveries and with only limited opportunities for productive investment at home. Such a country could reasonably estimate the so-called user cost of its petroleum —the present value of future production given up by producing today—to be as great or greater than the current world price. Such a country might reasonably believe, in other words, that its oil could appreciate in value over the average life of its reserves at a higher rate than the rate of earnings on risk-free foreign investment. Or it may believe that the risks—market and political—of all foreign investments are so great that they make speculation in oil inventories at home a more prudent investment.
>
> I am not certain there is such a country—*but that country surely is not Iran or Venezuela*, whose ability to absorb foreign exchange in profitable domestic investment ventures is insatiable, *nor is it Saudi Arabia*, whose potential reserves are so huge that the present value of a barrel of oil not produced today is truly negligible.
>
> No, to each of these countries, limiting production is rational *not* because its oil will be more valuable in the future but because *less production means higher prices today. Conservation, however, sounds more noble in the producers' own ears than maximization of monopoly profit*, and it appeals to a fashionable intellectual current in the rich consuming nations. The conservationist rhetoric is, therefore, a particularly effective ideological weapon of the cartel (emphasis added).

We need not be overly skeptical about the OPEC nations' belief in a doctrine that helped enrich them, when the same doctrine was believed by so many statesmen and scholars (including the majority of "energy economists") in Europe and America, who used it to rationalize policies that helped impoverish their own nations.

[16] As late as September 1980, it was possible for Cambridge economist Nicholas Kaldor to write seriously that, " . . . OPEC changed everything. By cornering oil it managed to increase the price fourfold, then double it again, and presumably it could be doubled again, *without any really serious impact on consumption*." (Emphasis added. From "The Energy Issues" in T. Barker and V. Brailovsky, *Oil or Industry*: edited proceedings of Conference on Policy Issues in Energy Self-Sufficient Economies at Different Stages of Industrialization, held at Oaxaca, Mexico in September 1980. London: Academic Press, 1981, p. 3).

[17] Youssef M. Ibrahim, "Saudi Role in OPEC Under Siege" in *The Wall Street Journal*, July 21, 1982, p. 33.

[18] "Oil Nation Warns its Partners," Associated Press story in the Seattle *Post-Intelligencer*, July 8, 1982, p. B9. On Saudi Arabia's threats, see *Platt's Oilgram*, July 13, 1982, p. 1A.

[19] D. deBruyne, quoted in *Petroleum Intelligence Weekly*, June 14, 1982, p. 8.

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ALASKA
REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH, FEBRUARY 1983, Vol. XX, No. 1

Sustainable Spending Levels from Alaska State Revenues

INTRODUCTION

In November 1982 the citizens of Alaska, fearing that state government was growing out of control, passed a referendum limiting state spending. This spending limit, which will become law in fiscal year 1984, puts a ceiling on the state budget and limits its growth to changes in population and prices. The initiative sponsors felt that limiting the growth of state spending would eliminate the problems associated with an overwhelming dependence on the soon-to-be-depleted tax base of Prudhoe Bay petroleum.

However, falling world oil prices during the past 18 months and an anticipation of stable prices for the next several years, have rapidly reduced, if not eliminated, whatever effectiveness the spending limit may have had in holding the level of spending below total revenues. The state, therefore, knowing that the current revenue level is derived largely from a dwindling tax base and cannot be sustained, must again address the question of how best to limit spending of current revenues.

This *Review* demonstrates that the spending limit as presently structured will be ineffective in either (1) producing savings out of current revenues

Shortly after the state began collecting revenues from production of Prudhoe Bay oil, an issue of the *Review* entitled "Alaska's Revenue Forecasts and Expenditure Options" (1978) showed that the then-prevailing trend in the growth of state spending would result in a current account deficit in 1989 and the elimination of the general and permanent fund balances by 1993. That *Review* laid out the policy options available to the state for dealing with the eventual decline in petroleum revenues.

Between 1979 and 1981, estimates of expected petroleum revenues increased dramatically, primarily because of the increase in oil prices. State spending for existing and new programs correspondingly increased, causing the state to become even more dependent on oil revenues for the support of government programs and the provision of jobs in the private sector than in 1978. Thus, despite dramatic oil price increases since 1978, the fiscal outlook for the state has not improved; in fact, unless new spending policies are enacted, it will have worsened.

In illustrating Alaska's dependence on oil, the following tabulation shows that no other state economy comes close to being as petroleum dependent as Alaska:

Percent of State Revenues Provided Directly by Petroleum

	Severance Taxes, Rents, Royalties	Corporate Petroleum Property Tax	Total
Texas (1978)	19.6	NA	NA
Louisiana (1978)	29.2	NA	NA
Oklahoma (1978)	15.0	NA	NA
Alaska (1982)	66.8	19.7	86.5

NA: Not available.

This dependence upon petroleum revenues is of particular concern due to the projections of falling revenues which have become the pattern in the last year. This *Review* re-examines long-run state spending options in light of changing conditions affecting state revenues and expenditures. It discusses the implications of the newly passed spending limit initiative, contrasting it with a sustainable spending limit and, in so doing, demonstrates the range of spending options available to the state as petroleum revenues decline.

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FEATURE

Scott Goldsmith — Sustainable Spending Levels from Alaska State Revenues

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or in (2) preventing a substantial long-term decline in government services and associated economic activity when oil revenues begin to fall. Since state expenditures must not exceed revenues over the whole cycle of petroleum extraction, it is the level of petroleum revenues measured over this cycle which should guide the establishment of a spending limit. Because petroleum revenues will decline in the next decade, even with new discoveries, a spending policy which will avoid severe budget reductions in the future must allow for the current investment of substantial revenues to cushion the decline. Consequently, the amount of future spending which can be supported depends not on an arbitrarily established limit, but on future petroleum revenues and a policy for current savings and investment.

After reviewing revenues from petroleum and other traditional and potential sources, this *Review* examines the future effects of the spending limit voted into law in 1982. It clearly demonstrates that because the limit is not based on anticipated levels of revenues and will not produce any significant savings or investment, it will not work. Indeed, it cannot work because revenues in the next few years will just about equal the current limit, and in later years will fall substantially short.

If the current spending limit will not work, then what, if anything, will? The author suggests an alternative spending rule based upon sustainable revenues. Specifically, his proposed limit would base allowable spending upon the sum of renewable revenues plus the annual real earnings of state assets. Under this rule, after an initial downward adjustment, state expenditures would be insulated from the decline in petroleum revenues. This rule would require both a substantial cutback in the state budget to approximately $1.5 billion and a large ongoing program of savings and investment of petroleum revenues over and above those currently flowing into the Permanent Fund.

The present spending limit and the proposed alternative set the bounds within which future state spending may occur. Contrasting the two clearly demonstrates the tradeoff Alaskans face when current spending exceeds the level which can be sustained in the long run.

ALASKA STATE REVENUES

For reasons set forth below, Alaska petroleum revenues will peak in the late 1980s and steadily decline throughout the 1990s. This will cause an accelerating loss of revenue and by the end of the decade pose a serious fiscal crisis, the solution to which must be reached within the next few years.

Petroleum

Revenues collected by Alaska state and local governments come overwhelmingly from the production of crude oil. Between 1977, the initial year of production from the Prudhoe Bay field on the North Slope, and 1982, petroleum revenues rose from 54 percent to 87 percent of total state general fund revenues. In recent years, transfers from the state general fund have become an increasingly important element of local revenues. Consequently, petroleum revenues support a large portion of local government as well as state government activity.

About 95 percent of Alaska crude oil production in recent years has come from a single "super giant" field[1] —the Prudhoe Bay field on Alaska's North Slope. This field ranks as the twelfth largest field ever discovered in the world and the largest ever discovered in North America (Table 1). The 10 billion barrels of recoverable oil at Prudhoe Bay make it a super giant. By comparison, only two other fields discovered in the United States—East Texas and Wilmington—initially held recoverable reserves in excess of 2 billion barrels. Except for these two, more oil has been removed from the Prudhoe Bay field during its first 4.5 years of production than any other North American field.

The Cook Inlet basin has accounted for the remainder of Alaska crude oil production since statehood. Production levels since statehood from Cook Inlet and Prudhoe Bay are shown graphically in Figure 1. Soon after the Prudhoe Bay field began production in 1977, the state production total jumped over 600 percent. Nearly 1 billion barrels of oil have been produced from Cook Inlet in the 23 years between statehood and the end of 1981. It now takes less than 2 years to produce the same amount of oil from Prudhoe Bay.

Less dramatic than the increase in total production in the late 1970s, but just as important, has been the decline in production from the Cook Inlet basin during the same period. This decline reflects the fact that every oil province follows a foreseeable cycle of growth, peak, and eventual decline. In 1981, Cook Inlet production had declined to 40 percent of its peak attained in 1970.

This pattern of growth, stabilization, and decline in annual production is characteristic of petroleum-producing areas as well as individual fields. It can be

Table 1

Prudhoe Bay Oil Field in Perspective

A. World's Largest Oil Fields

Name	Location	Size (Billions of Barrels)
Burgan	Kuwait	68.980
Ghawar	Saudi Arabia	60.278
Safania	Saudi Arabia	17.851
Kirkuk	Iraq	16.320
Samotlokskoye	USSR	14.600
Romashkino	USSR	14.040
Rumaila	Iraq	13.835
Gachsaran	Iran	11.435
Marun	Iran	10.887
Lagunillas	Venezuela	10.782
Agha Jari	Iran	10.084
Prudhoe Bay	USA	10.014

B. North America's Largest Oil Fields

Name	Location	Size (Billions of Barrels)
Prudhoe Bay	USA	10.014
Chiapas	Mexico	6.513
East Texas	USA	5.999
Wilmington	USA	2.418
Poza Rica	Mexico	2.028
Pembina	Canada	1.742
Midway Sunset	USA	1.683
Yates	USA	1.600
Wasson	USA	1.508
Kern River	USA	1.453
Panhandle	USA	1.415
Swan Hills	Canada	1.315
Ebano-Panuco	Mexico	1.304
Sho-Vel-Tum	USA	1.300
Elk Hills	USA	1.296
Naranjos Cerro Azul	Mexico	1.177
Huntington Beach	USA	1.076
Santa Ynez	USA	1.000

Source: "The Search Goes on for Giant Fields," *Oil and Gas Journal*, August 1977, p. 102. Since this table was compiled, significant discoveries made in Mexico have increased the estimated ultimately recoverable reserves from some fields. One field, Chicontepec, could rival Prudhoe Bay in size, but there is some controversy over the official Pemex estimate of its recoverable reserves of 10.96 billion barrels. See "World Oil Flow Slumps, Reserves Up," *Oil and Gas Journal*, December 29, 1980, pp. 75-82; and "Giant Chicontepec Given 42 Percent of Mexican Oil Reserves," *Oil and Gas Journal*, August 20, 1979, pp. 82-85.

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[1] A "giant" oil field in North America is defined as containing at least 100 million barrels of recoverable oil. Although giant oil fields contain about 75 percent of all reserves, they are relatively rare because only about 1 percent of fields are large enough to be classified as giants. Yet, the "super giant" Prudhoe Bay field is 100 times larger than a giant.

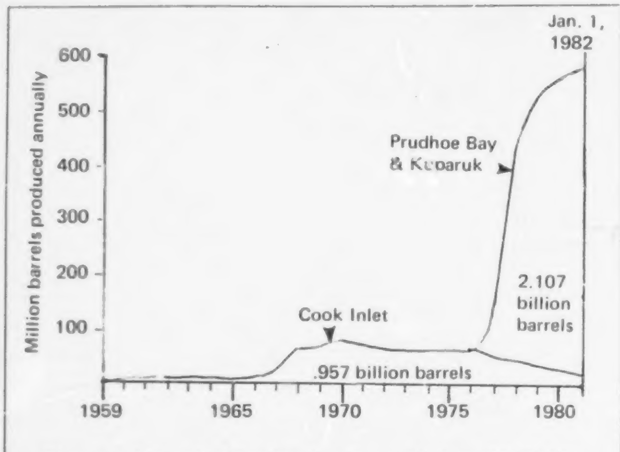

Figure 1. Historical Production from Alaskan Oil Fields

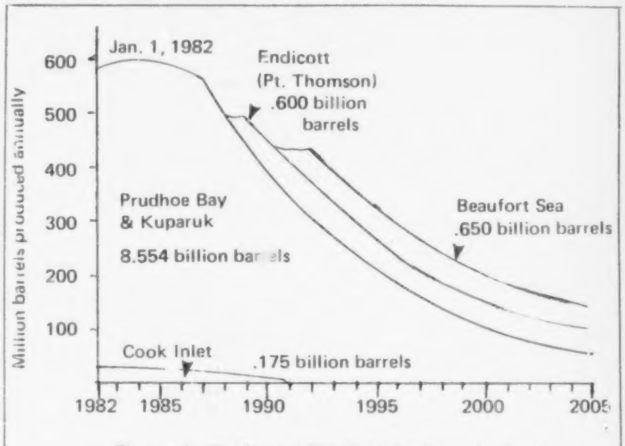

Figure 2. Projected Production from Proved Alaskan Oil Reserves

identified in every major oil-producing state. Texas, which has historically had the highest production rate of any state, by 1981 was producing at about 73 percent of the post-World War II peak it reached in 1972. Oklahoma is producing at 70 percent of its peak. In Louisiana, current production is now only about 48 percent of its peak. In Kansas and New Mexico the percentages are 53 percent and 55 percent, respectively. The same pattern holds in the other major producing states, except for California, which in 1981 surpassed its previous peak year of 1968 by 2 percent.

Because one supergiant field overwhelmingly dominates current Alaska production, the eventual production decline may be more abrupt in Alaska than elsewhere. Based upon current levels of proved reserves, including (in addition to Prudhoe Bay) Kuparuk, Endicott (Point Thomson), and state leases in the Beaufort Sea as well as Cook Inlet, the production peak will occur in the mid-1980s, and the subsequent decline will be rapid. This is illustrated in Figure 2, which projects through 2005 oil production from proved reserves in Alaska.

This projection illustrates two important points. First, Prudhoe Bay production will fall to one-third of its current level in little more than 10 years. Second, the introduction of proved reserves from new fields such as Kuparuk (which, at 1.125 billion barrels, is itself a large "giant" by North American standards) will have only a modest impact on either the number of years over which peak production can continue or the subsequent slope of the decline in aggregate oil production. Both are dominated by the absolute size of Prudhoe Bay. Thus, a field containing an estimated 600 million barrels of reserves, such as Endicott (Point Thomson), will provide only enough oil to fill the Alyeska pipeline for one year, or to postpone the production decline by one year.

We underestimate ultimate recoverable reserves by basing projections upon estimates of proved and probable reserves on currently leased state lands because the process of exploration and development is ongoing in the relatively unexplored Alaska frontier regions. Proved reserves are, in a sense, only the current inventory of the oil industry. Additions to that inventory continuously occur through exploration and development which both bring new fields into production and increase the ultimate production of existing fields.

A crude oil inventory including proved reserves and an estimate of recoverable undiscovered resources is shown in Table 2. As of January 1, 1982, proved reserves were 8.729 billion barrels, located mostly on the North Slope at Prudhoe Bay and Kuparuk, both of which are now producing. Additional state lands (Endicott and the Beaufort Sea) which are currently under lease and where exploration activity is ongoing are estimated to contain 1.250 billion barrels. These areas are also on the North Slope. Estimates of potential reserves in areas of the state currently not yet leased, both onshore and offshore, are speculative in nature. The most recent estimate for these unexplored regions is 21.5 billion barrels, the majority of which is estimated to be on federal lands on the North Slope or offshore in the Beaufort Sea.

Long Lead Time for New Discoveries

The amount of oil which will be discovered and ultimately produced from these regions depends upon the expected cost of field development in relation to the expected market price of the oil, both of which must be estimated many years into the future because

Table 2

Alaskan Crude Oil Resources Inventory

	Billion Barrels
Cumulative Production since 1959 (Jan. 1, 1982)	3.064
Prudhoe Bay	2.107
Cook Inlet	.957
Proved Reserves[a] (Jan. 1, 1982)	8.729
Prudhoe Bay	7.429
Kuparuk	1.125
Cook Inlet	.175
Probable Reserves on Currently Leased State Lands[a] (July 1982)	1.250
Endicott (Point Thomson)	.600
Beaufort Sea	.650
Economic Undiscovered Resources[b] (Dec. 1981)	21.5
North Slope onshore	2.1
Beaufort Shelf	8.2
Arctic National Wildlife Refuge	2.3
National Petroleum Reserve Alaska	2.1
Central Chukchi Shelf	1.6
Navarin Basin Shelf	2.3
St. George Basin	1.1
Bristol Basin	.6
Norton Basin	.3
Onshore South of Brooks Range & Offshore South of Aleutian Chain	.9

[a] State of Alaska, Department of Natural Resources, Proved and Probable Oil and Gas Reserves, North Slope, Alaska, July 1982.

[b] National Petroleum Council, *U.S. Arctic Oil and Gas*, December 1981 was utilized for estimates north of Aleutian Chain offshore and north of the Brooks Range onshore. Economic undiscovered oil was based upon an economic evaluation of recoverable reserves using a 10 percent real rate of return, p. 89. Other Alaska reserves were taken from U.S. Department of the Interior, U.S. Geological Survey, 1981.

of the very long lead times required for field development in the Arctic, estimated to be 10 to 15 years. Consequently, although it is safe to say that production from currently undeveloped fields will occur, it is impossible to project when it will occur and in what volumes. Smaller fields, fields requiring new technologies, and fields farther from existing pipelines will be more expensive to develop than Prudhoe Bay. Some discoveries may remain undeveloped if the costs are too high, even though they may be "giant" fields. The pace at which future discoveries are converted into production will slow down as more frontier provinces are explored. Consequently, the oil industry agrees that continued exploration and production from new fields will be unlikely to close the gap left by the decline of Prudhoe Bay production. Exploration chief Roger Hererra of the Sohio Alaska Petroleum Company, in discussing the decline in Prudhoe Bay production beginning after 1988, has stated, "We would need to find a new field each year to make up the difference . . . That's not very likely, and that's when the crunch may come." [2]

Importance of Oil Field Location

State revenues from petroleum also depend upon where that petroleum is located. Currently, virtually all proved reserves of crude oil lie under state lands. From this production, the state receives a royalty share and collects taxes on production and profits. In addition, it taxes petroleum-related property. Table 2 shows that most of the oil yet to be discovered is believed to lie onshore under federal lands or offshore under the outer continental shelf. Although the state will be able to tax petroleum production, property, and profits on federal onshore lands, it will receive only a share of the federal royalties earned. Offshore, beyond the 3-mile limit, the state has no taxing authority and will collect no royalties. Property taxation of shore-based exploration, development, and production facilities is currently the only method by which the state could collect revenues from outer continental shelf production. As a result, the state will be receiving a smaller share of the revenues from the development of most new fields.

The state's exact share is impossible to estimate accurately since the "rules of the game" for dividing the profits are always changing. Experience in dividing the profits from Prudhoe Bay production suggests that there will be continuing negotiations among the parties [3] over the distribution of profit shares, because the reward for changing the allocation formula is so great.[4] Consequently, it may be misleading to try to predict future revenues under current distribution rules. It is safe to say, however, that the oil companies and federal government will not be predisposed to change the rules governing the sharing of outer continental shelf revenues to favor the state of Alaska.

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[2] Alaska Growth Policy Council, 1981 Report to the Governor, p.24.

[3] In the case of Prudhoe Bay, the federal government, state government, local governments, and the oil companies.

[4] Rewriting the corporate income tax law, placing a ceiling on the severance tax, etc.

In summary, nearly all Alaska production and revenues come from the single largest "super giant" field ever discovered in North America. A decline in production from this field will begin in 5 years and continue into the next century. Production from proved reserves in other fields and new discoveries will not be sufficient to fill the gap left by the declining Prudhoe Bay production. The decline in state revenues will proceed more rapidly than the production decline because a large portion of new reserves is likely to be located on the federally controlled outer continental shelf where the state has no taxing authority.

Petroleum as a Nonrecurring Tax Base

Prudhoe Bay oil can appropriately be viewed as an asset worth $36 billion in 1982 dollars.[5] *At current rates of expenditure, Alaska is rapidly depleting this asset, and it has no equivalent asset to meet future needs.*

The preceding analysis suggests that the overwhelming dominance of crude oil production in the Alaska tax base is a transitory phenomenon. If one element of the state's tax base is nonrecurrent, it should be explicitly identified as such and revenues derived from that base treated differently from recurring revenues from a permanent tax base.

State oil revenues are proceeds from the sale of a part of the state's tax base—the state government's tax and royalty "share" of the oil. Of the five major categories of petroleum revenues, lease bonuses and royalty income most clearly represent the sale of a state asset. The other three revenue sources—the severance tax, the corporate income tax, and the property tax on oil and gas production and transportation-related property represent taxation of a nonrenewable resource. The state will receive these revenues only as long as oil is being produced and sold. In contrast, most other industries do not depend on a dwindling resource base. For them, current production does not preclude future production; they can generate a continuous flow of revenues from a continuous level of production. In the oil industry, however, if reserves are produced today, they will not be available as a tax base in the future.

Petroleum as a Capital Asset

Oil in the ground, therefore, particularly in such unusually large and likely unique fields as Prudhoe Bay, represents a capital asset owned by the state, similar to money in the general fund, state-owned land, or a state-owned office building. A rough estimate of the value of this capital asset can be calculated by multiplying the proved reserves of oil (at the start of the fiscal year) by the current per-barrel level of petroleum revenues. Thus, if as was true at the beginning of the 1983 fiscal year (July 1, 1982), there were 7.007 billion barrels of proved reserves of oil in the ground at Prudhoe Bay, and the current per-barrel state revenue from all petroleum taxes and royalties was $5.40, then the value of the state's share of the oil in the ground at that time was $37.838 billion (Table 3).

This estimate entails two simplifying assumptions. First, we assume that real per-barrel revenues in future years will be the same as they are today. Second, we assume that there is no discounting of those revenues which will not be collected until some future year. Inflation aside, a dollar received today is worth more than a dollar received in the future, because the dollar received today can be invested to earn a positive return, and consequently will be worth more than one dollar next year. To compare a dollar received in the future with a dollar received today, we must discount the future dollar by the earning potential of the dollar invested today. The discounted value is that amount which one would be willing to pay today in return for receiving a dollar at some time in the future. Banks, businesses, and individuals commonly apply discount rates to future revenue streams based on their investment opportunities, and the state should do the same. If the state can earn an average 2 percent annually (after accounting for inflation), then the future petroleum revenue stream should be discounted at that rate. This reduces the present value of the Prudhoe Bay tax base at the start of the 1983 fiscal year to about $31 billion, which represents the value today of the future stream of revenues the state will receive.

Changing Value of State's Share

The value of the state's share of the oil in the ground at Prudhoe Bay changes annually because (1) oil is being withdrawn from the field at the rate of 547 million barrels per year, (2) the real market value of oil fluctuates, (3) tax law modifications change the per-barrel tax liability, and (4) inflation changes the price of oil. The combination of these factors has caused the value of Prudhoe Bay oil in the ground to vary dramatically from year to year.

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[5] When comparing the value of any asset at different points in time, the use of nominal dollars not corrected for inflation can yield very misleading results. Consequently, in the text of this report, all figures are presented in 1982 dollars unless specifically identified otherwise.

Table 3

Value to the State of Oil in the Ground at Prudhoe Bay

Fiscal Year (ending in calendar year)	Initial Oil in Place (billion (barrels)	Production (billion barrels)	Production Related Petroleum Revenues (billion $)		State Revenues per Barrel		Undiscounted Value to the State of Oil in the Ground at Prudhoe Bay (billion $)	
			(Current $)	(1982 $)	(Current $)	(1982 $)	(Current $)	(1982 $)
1978	9.356	.314	.630	.892	2.01	2.84	18.806	26.650
1979	9.042	.433	.979	1.259	2.26	2.91	20.435	26.288
1980	8.609	.508	2.141	2.499	4.21	4.92	36.244	42.311
1981	8.101	.547	2.914	3.126	5.33	5.71	43.178	46.325
1982	7.554	.547	3.998	3.998	7.30	7.30	55.144	55.144
1983 (est.)	7.007	.547	2.956	2.763	5.40	5.05	37.838	35.362
1984 (est.)	6.460	.547	3.010	2.629	5.50	4.81	35.530	31.033

Source: Oil in Place from Alaska Oil and Gas Conservation Commission, *Statistical Report*, annual, converted to fiscal year basis, Prudhoe Bay field only.

State Revenues per Barrel is calculated as total production related petroleum revenues including Permanent Fund contributions and ANCSA payments (Royalty, Severance Tax, Property Tax, Oil and Gas Income Tax from Alaska Department of Revenue, *Revenue Sources*, annual) divided by annual production. The reserves tax is netted out of 1977 and the credit added into 1978 and 1979. These figures are a slight overestimate since they include Cook Inlet Oil Revenues. Bonuses are not included for 1980.

Value of state share of Prudhoe Bay oil is calculated as oil in place multiplied by per barrel tax revenues.

Anchorage consumer price index for 1982 assumed to be 265. Inflation from 1982 to 1984 assumed to be 7 percent annually.

The components of the year-to-year change in the asset value of Prudhoe Bay oil are presented individually in Table 4. At the start of each year, the initial value is determined as the product of quantity in place and average per barrel revenues. As the market price for oil fluctuates and the laws change, average per-barrel revenues increase or decline. This changes the value of oil in place (inventories). Over the course of the year, oil is withdrawn from the field; this generates revenues for the state. These revenues can be divided into the sale of assets and the conversion of assets. The sale of assets is that portion of petroleum revenues which goes into the general fund and is subsequently spent. Conversion of assets consists of that portion of petroleum revenues which is converted into a different form of asset—either physical or financial capital.

Looking at year-to-year changes in the real asset value of Prudhoe Bay oil in the ground, we see that holding wealth in the form of oil was a good investment from 1978 until late 1981 because, in spite of the annual withdrawal of 547 million barrels, the real value of oil in the ground grew from $28.96 billion in 1978 to $59.17 billion in 1981. Since then, however, the reverse has been true. The asset value of the state share of Prudhoe Bay oil fell by more than 20 billion dollars between 1981 and 1982 to $37.84 billion. This is primarily the result of a fall in per-barrel revenues from $7.30 to $5.05. In 1983, the value of the oil will decline by more than $2 billion, primarily because of the withdrawal of 547 million barrels from the field.

Prudhoe Bay oil is not the only component of state wealth. Other assets consist of natural resources on state lands and in state waters, both renewable and nonrenewable; and capital, both physical and financial. The monetary value of each asset in the state portfolio is equal to the present value of the future revenues expected to flow from it. The value of the state's natural resources and physical capital is not currently known. On the other hand, the value of the financial capital of the state is equal to its current balance. The Alaska Permanent Fund and the state general fund are the main elements of state financial capital. The net worth of semi-autonomous state agencies such as the Alaska Housing Finance Corporation and the Alaska Power Authority represent another element of the financial wealth of the state.

Table 4 includes the conversion of petroleum assets into financial assets in the Permanent Fund. This underestimates total asset conversion and overestimates the sale of oil in the ground because it does not show conversions to resources which do not have readily quantifiable values—such as the net worth of public agencies and additions to physical capital. However, it is clear that in each year since production began at Prudhoe Bay, the conversion of petroleum assets into alternative assets of readily identifiable value has been modest. In the early years,

Table 4

Components of Change in Undiscounted Value to the State of Oil in the Ground at Prudhoe Bay

Billion $

	Fiscal Year (ending in)						
	1978	1979	1980	1981	1982	1983	1984
Value of Oil in Ground (July 1)							
Current $	18.806	20.435	36.244	43.178	55.144	37.838	35.530
1982 $	26.650	26.288	42.311	46.325	55.144	35.362	31.033
Add: Change in Value of Inventories[a]							
Current $	2.259	16.788	9.074	14.880	−13.326	.648	NA
1982 $	3.201	21.596	10.593	15.966	−13.326	.606	NA
Deduct: Total Sale & Conversion of Assets (Petroleum Revenues)							
Current $	.630	.979	2.140[b]	2.914	3.980	2.956	3.010
1982 $	.893	1.259	2.498	3.126	3.980	2.763	2.629
Net Sales of Assets[c]							
Current $	.580	.895	1.910	1.629	2.771	2.317	NA
1982 $	.822	1.151	2.229	1.748	2.771	2.165	NA
Conversion of Assets[d] (Contributions to Permanent Fund)							
Current $	.050	.084	.230[b]	1.285	1.209	.639	.326
1982 $	.071	.108	.269	1.379	1.209	.597	.285
Equals: Value of Oil in Ground (June 30)							
Current $	20.435	36.244	43.178	55.144	37.838	35.530	NA
1982 $	28.959	46.625	50.406	59.170	37.838	33.206	NA

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[a] Change in value of reserves due to changes in both crude oil market price and state tax laws (calculated as the residual of year-end value plus sales and conversions minus year start value).

[b] Lease sale bonus revenues not included.

[c] Total petroleum revenues net of Permanent Fund contributions.

[d] $4 million contributed to the Permanent Fund in fiscal year 1977 is not included here. Includes the amounts transferred in 1981 through 1983 under the special appropriations made in 1981 and 1982.

Source: Petroleum revenues consist of royalties, severance taxes, property taxes, and oil and gas income tax including Permanent Fund contributions and ANCSA payments. The reserves tax is netted out of 1977 and added into 1978 and 1979 figures. Petroleum revenues are on a fiscal year basis.

transfers into the Permanent Fund averaged less than 10 percent of petroleum revenues. When special Permanent Fund appropriations were made in fiscal years 1981, 1982, and 1983, the conversion to financial assets still averaged only 32 percent of petroleum revenues.

Historical Fluctuation in State Wealth

By defining state wealth to include both the state's share of oil in the ground at Prudhoe Bay and the balance in the Alaska Permanent Fund, we can trace the historical fluctuation in total state wealth (Table 5). We see that in 1978, the combined value of these two assets was $29.035 billion, essentially all in the form of oil in the ground. In January 1983, state wealth was estimated to be $36.585 billion, with the proportion held in the Alaska Permanent Fund close to 10 percent. The growth of the Permanent Fund balance has been dramatic. When viewed in dollars corrected for inflation, however, we see that, absent further special appropriations to the Permanent Fund, its real value will increase much more slowly in future years. If nominal earnings are withdrawn from the Permanent Fund, a substantial portion of new, regular fund contributions will be required just to maintain the real value of the fund.[6] Assuming withdrawal of all earnings, the Permanent Fund balance is estimated to increase by only $64 million in 1982 dollars between 1983 and 1984 in spite of a contribution of $285 million over that period. Most of the fund contribution will be needed just to offset inflation which continuously erodes the real value of the Permanent Fund balance.

The Recurring Tax Base

Recurring state revenues are miniscule compared to current levels of state spending and cannot be realistically viewed as an answer to the state's impending fiscal crisis, unless a radically new approach is taken to the savings and investment of current state revenues.

State general fund revenues can be divided into six categories—four major and two minor. The first two—the sale of assets and income from investments—relate primarily to petroleum and have already been discussed. Recurring revenues collected from individuals and businesses constitute the other two major categories. The personal and corporate income taxes have historically been the most important of these recurring revenues. A small proportion of general fund revenues comes from the two remaining sources —federal transfers and user fees. Federal transfers are usually restricted to particular purposes such as capital investments for transportation and health projects or transfers to individuals. Ferry system receipts constitute the largest revenue in the category of user fees, which also includes court fees.

Table 6 presents a historical review of recurring state revenues in relation to nonrecurring petroleum revenues and investment earnings. Business revenues consist of the corporate income and gross receipts tax as well as business licenses. Revenues from individuals are defined as nonbusiness taxes plus nonbusiness licenses. The miscellaneous category includes both federal shared revenues and user fees as well as other small categories of government receipts.

In the current fiscal year of 1983, fully 86 percent of revenues are directly from nonrecurring petroleum activity; 7 percent of general fund revenues come from recurring revenues not directly related to petroleum. An equal proportion is contributed by investment earnings. However, most of the reported Permanent Fund earnings are more appropriately classified as the sale of an asset since earnings are calculated before inflation. The real earnings are just

Table 5

Combined Asset Value: Undiscounted State Share of Prudhoe Bay and Alaska Permanent Fund

(In billions of 1982 $)

	Fiscal Year (ending in calendar year)						
	1978	1979	1980	1981	1982	1983	1984
July 1. Assets							
Oil in Ground	$26.650	$26.288	$42.311	$46.325	$55.144	$35.362	$31.033
Perm. Fund Bal.	.006	.069	.161	.518	1.768	2.782	3.158
Total	$26.656	$26.357	$42.472	$46.843	$56.912	$38.144	$34.192
Change in Assets							
Oil in Ground	$2.309	$20.337	$8.095	$12.845	$−17.306	$−2.156	NA
Perm. Fund Bal.	.071	.108	.403*	1.379	1.209	.587	.285
Total	$2.380	$20.445	$8.498	$14.224	$−16.097	$−1.839	NA
June 30. Assets							
Oil in Ground	$28.959	$46.625	$50.406	$59.170	$37.838	$33.206	NA
Perm. Fund Bal.	.076	.178	.564	1.897	2.977	3.379	3.443
Total	$29.035	$46.803	$50.970	$61.067	$40.815	$36.585	NA

Note: All Permanent Fund earnings (nominal as well as real) transferred to General Fund.

*Includes proceeds of $114 million from Beaufort Lease Sale.

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[6] Under current law, a portion of Permanent Fund earnings must be retained for the purpose of capital preservation. This increases the estimated growth in the Permanent Fund balance. Current interpretation of the law, however, appears to define retained earnings as net of distribution of 50 percent of the fund earnings under the Permanent Fund dividend program. Consequently, at historical inflation rates, the real value of the fund will still decline without continuous large contributions.

Table 6

Sources of State Revenues

(millions of 1982 dollars)

	UNRESTRICTED GENERAL FUND REVENUES										TOTAL PETROLEUM REVENUES[g]	CONVERSION OF ASSETS	
	Total[a]		Business[b] Revenues (non-oil)	Individual[c] Revenues	Misc.[d] Revenues	Investment Earnings		Petroleum Revenues				Petroleum Revenues[h]	Gross Fund Withdrawals[j]
Year	(Nominal $)	1982 $				Before Inflation	After Inflation[e]	Total	Sale of Assets	Conversion of Assets[f]			
1974	$255	$512	$54	$150	$66	$83	$21	$159	$159	$0	$159	$0	$62
1975	333	584	71	213	78	68	17	154	154	0	154	0	51
1976	710	1,154	106	312	56	52	13	628	628	0	628	0	39
1977	874	1,331	122	381	55	53	13	720	720	0	726	6	40
1978	787	1,115	116	266	61	63	16	609	609	0	680	71	47
1979	1,179	1,516	109	203	75	76	19	1,053	1,053	0	1,161	108	57
1980	2,633	3,073	67	167	69	140	35	2,630	2,630	0	3,032	402	105
1981	3,718	3,989	88	43	74	244	61	3,540	2,573	967	3,952	1,379	183
1982 (pre.)	4,105	4,105	91	55	80	323	81	3,556	2,756	800	3,965	1,209	242
1983 (est.)	3,444	3,220	86	51	85	220	55	2,778	2,498	280	3,095	597	165
1984 (est.)	3,212	2,804	85	49	69	87	NA	2,514	2,514	0	2,789	285	NA
1985 (est.)	3,243	2,647	85	48	66	82	NA	2,366	2,366	0	NA	NA	NA

[a] Includes Native Land Claims payments in 1978 through 1980. In 1984 and 1985 Permanent Fund dividends not included in general fund revenues.

[b] Corporate income tax, gross receipts tax, business licenses.

[c] Non-business taxes, non-business licenses.

[d] Federal shared revenues, state resource revenues excluding petroleum (composed primarily of ferry charges, miscellaneous user fees, and sales of state property).

[e] General fund and permanent fund earnings net of amounts required to maintain real value of these funds. We assume that, due to inflation, 75 percent of nominal earnings is necessary to maintain asset value.

[f] Special Permanent Fund contributions.

[g] Including mandatory Permanent Fund contributions.

[h] Total Permanent Fund contributions.

[j] General and Permanent Fund earnings before inflation minus earnings after inflation. (This ignores general fund deposits in some years which may have an offsetting effect.)

Source: Alaska Department of Revenue, *Revenue Sources*, annual.

a small portion of the nominal return.

In contrast, almost 53 percent of revenues in 1974 were collected from individuals, nonpetroleum businesses, and miscellaneous sources. Over the last several years, primarily because of the elimination of the personal income tax, there has been a dramatic fall in both the real amount as well as the percentage of revenues derived from individuals, and this has occurred at a time of rapid population and income growth. In 1983, only an estimated $51 million will be collected from individuals, compared with $381 million as recently as 1977. Similarly, there has been a decline in real revenues from non-oil-related business, but it has not been as precipitous as the decline in individual revenues. Whereas taxes and other revenues collected from individuals were more than double those collected from non-oil businesses in 1977, non-oil business receipts were almost double those of individuals by the early 1980s. The expansion of investment earnings during this period has only partially offset the decline in revenues from individuals and non-oil businesses. After correcting for inflation, we find that real investment earnings remain a modest source of revenues.

Future Revenues: Actual and Potential

Even if Alaska's personal income tax is reinstated and its corporate tax rate increased, Alaska's revenue gap—the difference between projected revenues and state expenditures under the current spending limit—will approach $1 billion by 1991.

Figure 3 shows a projection of future revenues based upon likely petroleum production (including natural gas) from leased areas as well as current trends in recurring (individual, non-oil business, and miscellaneous) general fund revenues. A revenue gap appears in 1989 at about the time production from Prudhoe Bay begins to decline. Revenues then fall during each succeeding year. Neither investment earnings nor business, individual, or miscellaneous revenues will be large enough by 1990 to offset the fall in petroleum revenues.

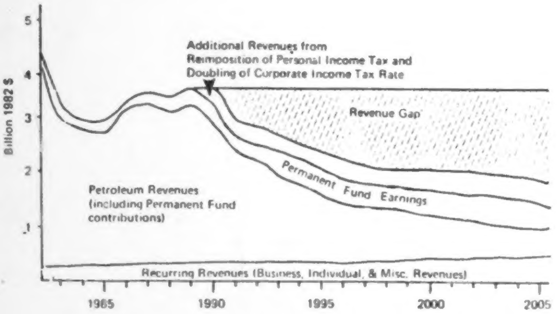

Figure 3. Projected State Revenues: General Plus Permanent Fund

Several strategies have been suggested for dealing with this projected revenue gap:

1. **Increase the flow of petroleum revenues.** This could result from raising the per-barrel tax rate or increasing production on state lands. However, tax increases could only temporarily compensate for declining production and could accelerate it. To fully replace the revenue which the state will lose from the decline in the Prudhoe Bay field would require development of a new field on state lands every year. We have shown, and all knowledgeable sources agree, that this is virtually impossible.

2. **Rely on the development of nonpetroleum natural resources.** Comparing the value of natural resource industry outputs in Alaska indicates that no alternatives could expand enough in a few years to generate the level of sales necessary to provide a tax base comparable to petroleum (Table 7). In 1981, petroleum (crude oil plus natural gas) accounted for 92.5 percent of natural resource sales; seafood contributed 5.9 percent. All others combined totaled only 1.6 percent.

   For example, just to match the value of petroleum output, the fishing industry would need to expand 1,600 percent. Profitability in the industry would also need to increase. The resource base will not allow this.

   Alternatively, coal, of which Alaska has large reserves, is often suggested as a successor to petroleum. Many deposits are not now economically attractive because of their location, but fields such as the Beluga and Nenana have a definite potential for development and expansion during the coming decade. If the state royalty and related taxes were to total $1 per ton of coal (which is higher than current state revenues per ton of coal produced), then an annual production of 4 billion tons would be required to equal the nearly $4 billion in petroleum revenues collected by the state in fiscal year 1982. Four billion tons is about 4,000 times current production and is also approximately the total demonstrated reserves in these fields.[7]

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[7] Alaska Department of Natural Resources, Open File Report, No. 51, 1975.

Table 7

Market Value of Unprocessed Alaska Natural Resources: 1981

	Million $	Percentage
Crude Oil	$12,396	91.9%
Seafood	792	5.9
Timber	120	.9
Natural Gas	83	.6
Gold	54	.4
Coal	18	.1
Agriculture	12	.1
Furs	6	.1
Other Minerals	4	
Total	$13,485	100%

Note: Petroleum value calculated at wellhead. All others calculated at Alaska market price.

Source: Crude oil, natural gas, and gold from Division of Budget and Management, Office of the Governor, *Alaska Statistical Review*, 1982. Coal, other minerals, furs, timber, estimated by author by extrapolation. Seafood from Alaska Department of Fish and Game (preliminary). Agriculture from *Alaska Agricultural Statistics*, 1982.

Thus, it would be physically impossible to generate the same amount of revenues from coal as from oil. Development of the coal industry may produce a stable number of jobs and a flow of revenues, but it cannot replace the magnitude of revenues generated by petroleum.

3. **Rely on downstream processing of, or value added to, Alaskan resources.** Currently, revenues from such downstream processing are primarily obtained from the corporate income tax. At current tax rates, the corporate tax base would need to grow to over 100 times its current size to replace the revenues from petroleum in 1982.

4. **Reimpose the personal income tax and increase corporate tax rates.** Reimposing the personal income tax and doubling the corporate income tax rate would increase individual and business taxes only modestly, as shown in Figure 4. This strategy would fill the revenue gap for only one year and would subsequently reduce it by only a small percentage.

Clearly, no one of these strategies is capable of filling the gap. In addition, adopting all of them would likely yield revenues no higher than those estimated to result from increased taxation of income, because tax increases tend to restrict the growth of the tax base. The revenue gap thus presents the state with a difficult choice regarding future expenditures. On the one hand, the revenue gap can be ignored. This would mean adjusting to continuously declining revenues beginning in 5 years. On the other hand, investment strategies using a portion of current revenues could be devised to provide a future stream of earnings to replace declining petroleum revenues.

THE SPENDING LIMIT

By 1988, state revenues will fall below the state spending limit and set the stage for a run on the state's accumulated surpluses, including the Permanent Fund.

Beginning with the fiscal year 1984 budget, the state will limit expenditures by placing a ceiling on appropriations which changes from year to year with population and inflation. The ceiling, established at $2.5 billion for the base fiscal year 1982, exempts only debt service, Permanent Fund dividend payments, voter-approved capital expenditures, and supplementary Permanent Fund appropriations. The limit also specifies that at least 33 percent of appropriations must be allocated to capital expenditures and loans.

The spending limit of $2.5 billion will not be a real constraint on appropriations in any future year because general fund revenues are projected to at most equal or fall short of allowable spending under the formula limit every year (Figure 4). This projec-

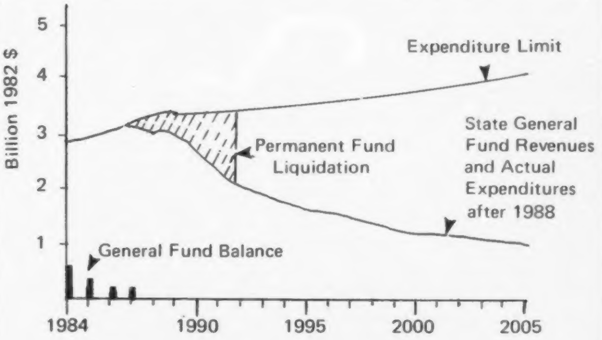

Figure 4. State Fiscal Situation: $2.5 billion Constitutional Spending Limit*

*The expenditure limit grows in constant 1982 dollars due to population growth which is projected at the rate of 2 percent annually. Without population growth, the expenditure limit ceiling would be a flat line.

tion is based upon the assumptions summarized in Table 8.[8] Spending up to the limit can occur during the first 4 years, beginning in FY 1984, only by drawing upon the accumulated balances in the general fund. Rather than generating savings by limiting spending, the limit permits the liquidation of the modest general fund balance.

By 1988, the spending limit ceiling will have become ineffective because the rising ceiling will have surpassed revenues. By 1991, revenues will have fallen $1 billion below the limit, and in subsequent years, the revenue gap will continuously increase (Figure 5). By 1995 it will equal $2 billion—half the level of 1982 revenues. Although the growth of this gap between spending and revenues will subsequently slow down, in 10 more years it will still reach $3 billion. This gap represents the amount of revenues that would be required from new sources to keep state spending up to the ceiling defined by the limit formula.

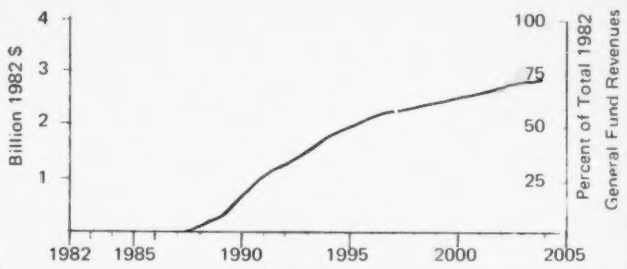

Figure 5. Revenues From New Sources Necessary to Fill Revenue Gap Under Spending Limit

The Permanent Fund is the only financial asset which the state could draw upon to fill the revenue gap created by falling revenues and a growing spending limit ceiling. When revenues fall below the ceiling, however, the Permanent Fund balance will be about $4.5 billion, a modest amount because of the annual

Table 8

Principal Assumptions of Projections

STATE REVENUES	
Petroleum	
Royalties	Approximate Dept. of Revenue, Dec. 1982, 50% probability forecast with 2% annual decline after 1998.
Severance Tax	Approximate Dept. of Revenue, Dec. 1982, 50% probability forecast with 2% annual decline after 1998.
Corporate Tax	20% of severance tax.
Property Tax	Dept. of Revenue, June 1982 forecast with 4% annual growth after 1984.
Bonuses	Zero.
Recurring Revenues	
All Revenues determined by MAP econometric model at currently existing tax rates.	
RETURN ON INVESTMENT	
Real rate of return on general fund balances	2% annually.
Real rate of return on Permanent Fund balance	3% annually.
SPENDING LIMIT	
Inflation	7.4 percent long-run average annual rate.
Population	2 percent annual growth.

Royalties and severance taxes are the June 1982 30-percent probability forecast of the Department of Revenue. The undiscounted sum of petroleum revenues as projected by the Department of Revenue were 8 percent lower in September 1982 than in June and are expected to be again lower in December. Thus, we estimate the 30-percent probability forecast of June to approximate the December 50-percent probability forecast.

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[8] The projection also assumes that oil and gas exploration, development, and production remain important basic activities, and growth occurs in fish harvesting and processing, mining, timber, manufacturing, and tourism. The state budget is divided as follows: capital spending is assumed to be one-third of the total and to be divided equally between construction projects and subsidies to housing and industry. All capital expenditures are paid from the general fund. Consequently, the only expenditure items not covered by the ceiling consist of Permanent Fund dividends at the rate of one-half of nominal Permanent Fund earnings and debt service payments which decline each year as outstanding bonds are paid off. The Permanent Fund receives its constitutionally mandated share of petroleum royalties and bonus payments, while all other excess current account revenues remain in the general fund where they earn interest until spent.

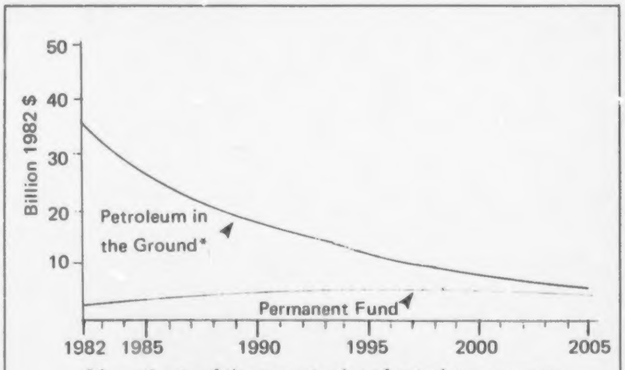
withdrawal of both real and nominal earnings to fund the Permanent Fund dividend program and to supplement general fund revenues.[9] Because of these withdrawals, the real value of the accumulated balance in the Permanent Fund (before annual contributions) will have been eroding about 7.4 percent annually (the inflation rate), and contributions from royalties and bonuses equal to 7.4 percent of the accumulated balance will be necessary each year just to keep abreast of inflation.

Although the Alaska constitution prohibits withdrawal of principal from the Permanent Fund, the emergence of a revenue gap would generate tremendous pressure to open it up. If the Permanent Fund were opened at this time to maintain spending levels, it would be completely spent within 4 years. At the end of that time, the state would find itself with no sources of funds with which to replace falling revenues, and state expenditures would have to be cut sharply and abruptly.

The spending limit will not serve to avoid a revenue gap because it will ineffectively restrict spending in the early years. It establishes no framework for determining the proper levels of investment out of petroleum revenues and, consequently, will generate an insufficient level of recurrent earnings from investment. The major asset the state will have as revenues fall is the Permanent Fund, the earnings and principal of which will be insufficient to fill the gap for long.

Figure 6 shows that with the present spending limit in place, the assets of the state, defined as the sum of oil in the ground plus the Permanent Fund, will rapidly dissipate. (Other assets such as home mortgages are not included because we have no information on the current or projected state holdings of these assets. Regardless, even a portfolio of these assets worth $5 billion would not significantly alter the picture.) Petroleum cannot be converted to other forms of wealth quickly enough under the present spending limit to maintain the asset portfolio from which earnings are generated. Thus, as the state portfolio declines, so will asset earnings.

In the coming years, public sector demands for providing basic services in education, health, social services, resource management, public protection, and transportation will continue to grow with the economy and real incomes. However, by the end of the century only about $1 billion annually (1982 dollars) will be available to fund all government programs. The cutbacks required to live within a $1 billion budget constraint will be drastic and will undoubtedly eliminate many programs considered necessities.[10]



*An estimate of the present value of petroleum revenues based on a discount rate of 2 percent.

Figure 6. Portfolio of Public Wealth

A second consequence of a cutback in state spending will be a large economic contraction, resulting from decreased government spending in the economy. Currently, operating budget appropriations are used to pay the wages and salaries of over 15,000 state government employees as well as support a large number of the 24,000 local government employees through various local revenue transfer programs. Thus, about one in six of the 200,000 jobs in the state economy directly result from state operating appropriations. In addition, the capital budget directly provides employment to a significant portion of the construction industry. Also, the Permanent Fund dividend program and state loan programs pump income into the economy on a scale similar to the payroll of a major industry like construction or manufacturing. Overall, about one-third of current personal income can be traced, directly or indirectly, to state government spending. Like other industries, state spending has a "multiplier" effect in the trade, service, finance, and other support sector industries of the state. A forced reduction in spending would cause a contraction of private support sector activity because the "multiplier" works in a negative as well as in a positive direction.

A more optimistic projection of petroleum revenues does not appreciably alter our conclusions. This becomes evident when we compare the accumulated balance in the general fund in 1988 under present revenue projections with higher revenue projections. Under current projections, the general fund balance in 1988 would be $68 million. A 20-percent increase in petroleum revenues (an approximate increase from $20 to $25 billion in nominal dollars) would result in the accumulation of $2.4 billion (in 1982 dollars) in the general fund. This would fill the revenue gap until 1992.[11]

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[9] Reinvestment of Permanent Fund earnings would only marginally change the conclusions.

[10] Future expenditure flexibility is further limited by the spending limit requirement that at least one-third of appropriations be for capital projects, about twice the historical proportion. The operation and maintenance of this new capital stock will place added demands on shrinking revenues in future years.

By lowering the spending limit ceiling, we can reduce and delay the revenue gap but not eliminate it. If the initial ceiling were set at $1.5 billion, state expenditures would more closely balance with revenues (Figure 7). The state would be able to sustain a surplus on current account in the general fund through 1995. Through the accumulation and investment of these surpluses, the general fund would grow dramatically to a peak of $8 billion (1982 dollars) by 1992.[12] In this case, when the decline in petroleum revenues reduced current account revenues below the expenditure limit, the general fund balance could be used to cover the revenue gap and sustain spending. Withdrawals would not exhaust the general fund until 2003. At this point there would again be tremendous pressure to open up the Permanent Fund, despite a state constitutional prohibition. If the state were to withdraw from the Permanent Fund, its balance would be used up in about 4 years. Thereafter, the state would again be facing a revenue gap with no means of filling it.

The lower spending limit would help the state to both live within its means and accumulate a fund which could be drawn upon to sustain spending for 10 years after petroleum revenues begin to decline. However, it would not eliminate the revenue gap problem, only postpone it. Because state spending under this limit would be allowed to grow more rapidly than nonpetroleum revenues, the growth of spending would eventually outstrip the growth of nonpetroleum revenues. This problem can be handled only by restructuring the spending limit.

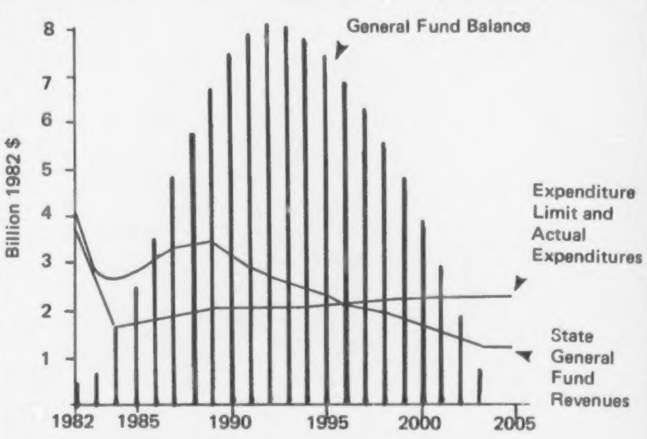

Figure 7. State Fiscal Situation: $1.5 billion Constitutional Limit

THE SUSTAINABLE STATE EXPENDITURE LEVEL

A spending rule that would hold annual appropriations at or below the level of sustainable revenues would allow the state to live within its means and avoid the future need for sharp and massive cuts in expenditures as oil revenues decline.

Because the current spending limit does not generate savings outside the Permanent Fund, public services must fall dramatically when petroleum revenues decline. Preferable therefore would be an alternative spending rule that prevents a precipitous decline in government spending with its attendant negative impact on the private sector. One possibility would be a level of spending that could be sustained in the future independent of year-to-year fluctuations in petroleum revenues.

A sustainable expenditure level is one which can be maintained at a constant or growing level in "real" terms (corrected for inflation) when petroleum revenues decline. It must incorporate two elements. First, each year a savings/investment decision must be made simultaneously with the spending decision rather than treating savings as the residual left after spending. In other words, spending each year should be guided by long-range fiscal considerations rather than by the amount of revenues available for the current year. Second, spending must not grow faster than recurring revenues—revenues independent of dwindling resources.

Implementing this strategy first requires that the level of sustainable revenues be calculated, because this will determine the sustainable spending level. Sustainable revenues consist of the sum of all recurring revenues[13] plus the earnings on the

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[11] Which is approximately comparable to a movement from the 50-percent to 70-percent level of the cumulative frequency distribution of the Department of Revenue petroleum revenue forecasts.

[12] During the interval from 1993 to 1995, a positive general fund current account balance would be increasing the nominal value of the general fund balance, but not fast enough to offset the erosion of real value due to inflation.

[13] In practice, there is no clear distinction between a recurring and a nonrecurring revenue because, on the one hand, revenues

(Footnote 13 continued)

portfolio of state wealth. While it is relatively easy to estimate recurring revenues based upon past trends in nonpetroleum business and personal taxes as well as miscellaneous revenues, it is more complicated to estimate the value of the state portfolio of wealth. However, there is no doubt that it now consists primarily of Prudhoe Bay oil and the Permanent Fund balance (Table 5). The annual real return on these assets, which consists of a portion of annual petroleum revenues and real fund earnings, is the earnings on the state portfolio.

The real monetary earnings on the assets held by the state in 1982, both in the form of oil in the ground at Prudhoe Bay and in financial assets, totaled approximately $750 million. This was the earnings, at a 2.5 percent real rate of return, on assets with a present value of $30 billion. Recurrent revenues were about $450 million, including petroleum revenues from fields other than Prudhoe Bay. Thus, total sustainable revenues equaled about $1.2 billion.[14] In nominal dollars, this would be about $1.475 billion in 1984 (Table 9).

These revenues of $1.475 billion in 1984 would cover not only operating and capital expenditures, but also debt service and Permanent Fund distributions (which are outside the current spending limit). The difference between actual revenues collected and sustainable revenues spent under the limit would go into savings/investment for maintenance of the sustainable revenue level in future years. As the level of recurring revenues, inflation, and earnings on the portfolio of state assets changed, the spending limit ceiling would also change.

The result of implementing the sustainable spending strategy without reimposing the personal income tax is illustrated in Figure 8.[15] We assume that expenditures would gradually fall over a 3-year period from their current level to the sustainable limit, after which they would grow indefinitely with recurring revenues. State general fund spending would be less than general fund revenues from the initiation of this strategy until 2005. Each year, revenues in excess of recurring revenues would be saved and invested. We assume this savings would go into the general fund, although it could go into the Permanent Fund. In a short time, the general fund would grow larger than the Permanent Fund. Earnings from the general fund would become an increasingly important component of total revenues. After 1997, the general fund balance would begin to fall in real

Table 9

Calculating Sustainable Spending

A. Components of Annual Sustainable State Revenues (million 1982 $)

Recurring Revenues		$450
Recurring Petroleum (excluding Prudhoe Bay)	$250	
Current Nonpetroleum	200	
Investment Earnings (see below)		750
Total Sustainable Annual Revenue Flow		$1,200
Equals: Total Sustainable Annual Expenditures		$1,200
Total Sustainable Annual Expenditures (1984 fiscal year)		$1,475

B. Investment Earnings Matrix (million 1982 $)

	Present Value of State Investment Holdings (Prudhoe Bay plus Fund Balances) (billion 1982 $)					
Real Return on Investments	$10	$20	$30	$40	$50	$60
0%	$0	$0	$0	$0	$0	$0
1%	100	200	300	400	500	600
1.5%	150	300	450	600	750	900
2%	200	400	600	800	1,000	1,200
2.5%	250	500	750	1,000	1,250	1,500
3%	300	600	900	1,200	1,500	1,800
3.5%	350	700	1,050	1,400	1,750	2,100
4%	400	800	1,200	1,600	2,000	2,400

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[13] (Continued)

from depletable resources may continue for such a long time that they become, in effect, recurrent; and recurrent revenue sources may disappear with shifts in economic activity. The most obvious example of a dwindling revenue is the proceeds of a one-time bonus lease sale. Consequently, in this analysis, we treat Prudhoe Bay revenues as a one-time windfall that is dwindling and other petroleum revenues as well as all revenues from other sources as recurring. In fact, our analysis is relatively insensitive to a shift in the definition of other petroleum revenues between recurring and nonrecurring.

[14] Reimposing the personal income tax could raise this limit by about $200 million.

[15] We phase out the Permanent Fund dividend program, local government grants from the capital budget, and all loan subsidization over a period of three years through 1986. A downward adjustment of the economy occurs in 1984 in response to the imposition of the sustainable spending limit. Expenditure growth after 1984 is determined by the rate of inflation and by the absolute growth in recurring revenues. Because

[15] (Continued)

recurring revenues are projected to grow slowly under current tax laws, the growth of expenditures is much slower than in the case of the spending limit formula.

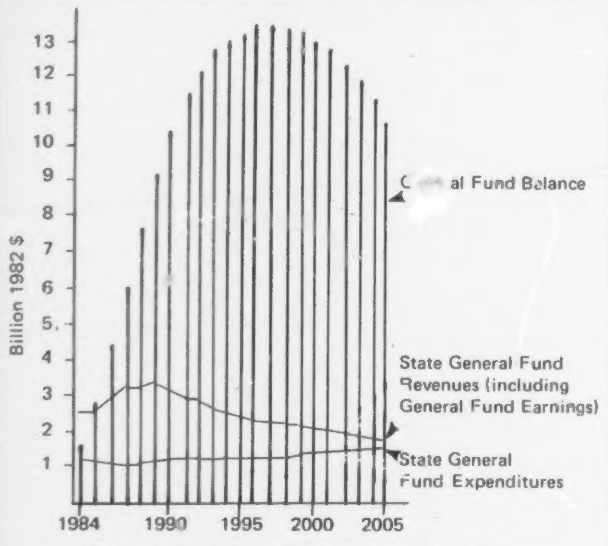
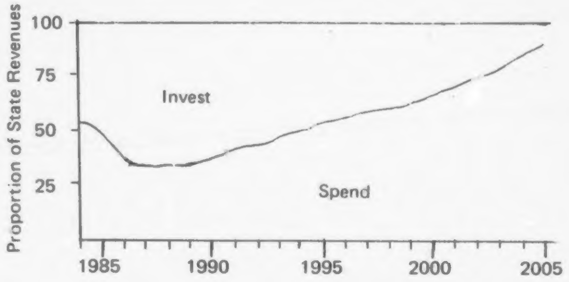


Figure 8. State Fiscal Pattern: Sustainable Spending Strategy

dollars, due to withdrawals, even though it continued to grow in nominal dollars. Because we assume in this case that Permanent Fund earnings would be reinvested until needed, the value of the fund would grow much more rapidly than in the previous examples. In 2005, the balance would be $12.1 billion rather than $5.3 billion (in the case where all earnings are withdrawn). Eventually, the real earnings of the Permanent Fund would become the main source of state revenues. At some point after 2000, as Prudhoe Bay petroleum revenues ran out, actual revenues would be no greater than sustainable revenues, and at that time, expenditures would be set to equal actual revenues.

This strategy provides both a savings and a spending formula. The savings and investment necessary to maintain the level of sustainable revenues in future years is the difference between actual revenues and sustainable revenues. The year-by-year allocation between spending and savings/ investment is shown graphically in Figure 9. In the early years, savings and investments, not including investments in the Permanent Fund, must be greater than spending if a sufficient asset base is to be built up to avoid the revenue gap.

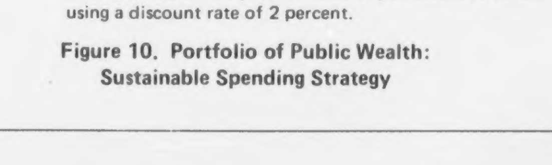
The portfolio of public wealth would evolve over time, as shown in Figure 10. As the value of oil in the ground declined with extraction, it would be replaced by a growing value of financial capital in the form of the general and Permanent funds. Earnings from financial assets would replace petroleum revenues as the primary funding source for state government. This conversion plan and its maintenance would require a particular type of discipline and restraint. The state portfolio of assets would be composed of discretionary assets rather than the current nondiscretionary oil reserves; maintenance of the asset value would require considerable prudence and orientation to long-term needs.



Note: Constitutionally mandated Permanent Fund contributions not included.

Figure 9. Proportions of General Fund Revenues Invested and Spent in Sustainable Spending Strategy

After the initial expenditure adjustment, dramatic year-to-year variations in spending and the attendent dislocations could be eliminated under this plan. Recurring revenues change modestly from year to year. The earnings potential of assets in the state's portfolio would vary from year to year, for example, due to proceeds from a lease sale, from adjustments in the value of existing assets, or from an adjustment in the real rate of return on the portfolio. Although each of these factors could significantly affect earnings in the short run and create considerable uncertainty in the long run, prudence suggests using some combination of past values for these variables in



*An estimate of the present value of petroleum revenues using a discount rate of 2 percent.

Figure 10. Portfolio of Public Wealth: Sustainable Spending Strategy

estimating earnings from assets. This would smooth out any year-to-year variation.

The amount of sustainable spending in any year is primarily a function of three variables. They are (1) the real return on state assets, (2) the level of petroleum revenues, and (3) the level and growth of revenues from recurring sources.

The real return on state assets is the most important determinant of the sustainable spending level. This can be seen clearly in Table 9, part B, which shows, for various state portfolio levels and real rates of earnings, the annual contribution to sustainable spending (real earnings) from the asset portfolio. For example, we have assumed a real return of 2 percent on the general fund and 3 percent on the Permanent Fund, for a combined rate of approximately 2.5 percent. At this rate, a $30 billion portfolio would produce $750 million in sustainable spending annually. A change in the interest rate of .5 percent would change sustainable spending by $150 million.

About 90 percent of state assets are currently held as petroleum (Table 5). If the present value of petroleum revenues is double current estimates (the estimated December 1982 50-percent confidence level of the Department of Revenue), then annual spending of $1.5 billion rather than $750 million could be sustained from them, and the spending ceiling could be raised to $1.95 billion (1982 dollars). Smaller portfolios would produce smaller annual earnings.

When petroleum revenues are received is also important. The rate of return on oil in the ground is the increase in its value as its real price rises. Projections of petroleum revenues in past years assumed the real price at the wellhead to be rising about 2 percent annually. In such a case, the state would gain as much by holding its assets as oil in the ground as it would by holding them in the form of a financial asset earning a 2-percent real return. However, if the oil in the ground is not increasing in value each year, the state should prefer to hold its wealth in the form of a financial asset earning a 2-percent real annual return. Of course, the state has relatively little control over the timing of Prudhoe Bay oil production, but it must recognize that if it holds an asset which earns no positive rate of return, the present value of that asset is less; consequently, the level of sustainable revenues is less.

The sustainable spending strategy is independent of the rate of population growth, unlike the recently enacted spending limit. The advantage of this independence is that the revenue gap does not appear sooner if population growth accelerates as would be the case under the present spending limit. It is a disadvantage because government services are primarily provided to individuals, and a larger population requires a larger budget if it is to receive the same quality of public services.

The Investment Portfolio

Sustainable revenues from a state portfolio of investments are only possible if those assets generate a positive net flow of revenues into the general fund.

Implementation of a state spending strategy linked to sustainable revenues would require very substantial savings/investments over the next 10 years. Up to this point, for simplicity, we have analyzed that portfolio in terms of only two alternatives—oil in the ground and financial assets (the Permanent and general funds). In reality, there is a broad range of assets in which the state could invest. The primary consideration in any investment choice is the earning potential of the investment because sustainable revenues depend upon real positive earnings, as was demonstrated in Table 9.

To judge its appropriateness as an investment for generating sustainable revenues,[16] the rate of return on any asset—be it a natural resource or a piece of physical capital—can be measured against the return available on financial capital. For this purpose, the proper measure of the rate of return is the net flow of revenues into the general fund. For example, if general fund investments earn a 10-percent return (of which 8 percent is the result of inflation and 2 percent represents a real return on investment), then to be equivalent, a state investment of $1 billion in infrastructure would need to produce at least $20 million in recurring state tax revenues annually over and above operations, maintenance, and replacement costs. Accordingly, all state investments earning anything less represent a cost and should be viewed as such.

State investment policy may have objectives other than maximizing asset earnings, such as subsidizing certain activities or creating jobs. Without addressing the question of the most appropriate means for meeting these objectives, it is clear that a state portfolio consisting of such investments could not sustain the maximum flow of annual revenues.

Suppose, for example, that the state chose to invest the general fund in a portfolio of investments consisting of subsidized loans, earning a positive nominal but zero real rate of return. It would find that an otherwise sustainable spending level of $1.475 billion could not be maintained because the investment portfolio would return its initial value in inflated dollars but would provide no positive return and thus could contribute nothing to sustainable revenues.[17]

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[16] Public capital expenditures are normally made not to produce public revenues but to serve a public purpose. All such capital purchases are defined in this analysis as spending since they do not represent the creation of a revenue-producing asset.

Figure 11 shows the combined balance in the general and Permanent funds at different real rates of return on fund balances with adoption of the sustainable spending strategy. If the portfolio of state investments were earning a below-market rate of return, fund withdrawals would reduce the portfolio value and the spending level would be found to have been set too high. In the extreme, if the real rate of return on the combined general and Permanent Fund balances were zero, then no sustainable revenues would be generated from the asset portfolio. Figure 11 shows that the danger of holding assets which generate no real earnings would not become apparent until the 1990s, when asset earnings would become the primary revenue source. During the 1980s, when the primary source of spending was petroleum revenues, which were unaffected by the level of financial earnings, the gap between the value of the portfolio at market rates and at subsidized rates would be small.

Policy Initiatives for Attaining Sustainable Spending

As recently as 1980, the state's budget was under the sustainable limit, and a rollback to that level would be easier today than the elimination of essential services in the future.

Figure 12 compares the pattern of future general fund spending under the current spending limit with our sustainable spending alternative. These two alternatives define the range of options available for structuring state expenditures in future years.

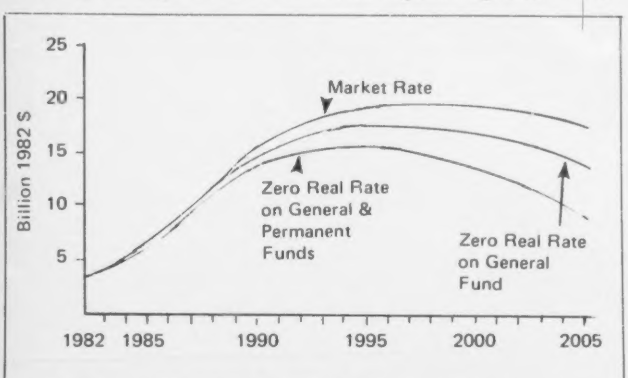

Figure 11. Combined Fund Balances Resulting from Different Rates of Return on State Asset Portfolio

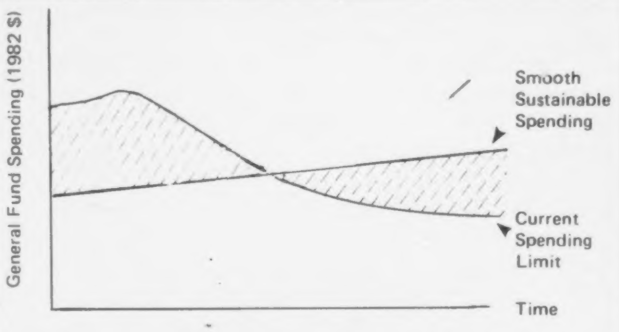

Figure 12. The Range of General Fund Spending Options

The current spending limit allows considerably more spending in the near term and less in the future, as spending in early years is determined by the limit and in later years by declining revenues. With the sustainable spending strategy, however, spending starts lower and rises slowly over time as recurring revenues grow. Between these two extremes, a large number of alternatives is possible, representing different amounts of current savings consistent with increased spending in future years.

The tradeoff between present and future public spending implicit in the current spending limit is clearly illustrated. If spending in any year exceeds the sustainable level by, say, $1 billion, then in some future year spending must be under the sustainable limit by $1 billion. For example, if we choose a current $2.5 billion budget instead of a $1.5 billion one, then we must pay for that $1 billion difference with a future budget reduced from $1.5 billion to $0.5 billion. If on the other hand, we establish a sustainable baseline budget of $1.5 billion, then future budgets could continue at or above that level indefinitely.

Because the current budget contains many nonessential items, a one-time rollback in current government spending by $1 billion would be much easier to accomplish today than would annual budget reductions over a period of decades during the era of declining petroleum revenues. In fact, as recently as 1980, state spending was within the sustainable budget level, and it has been only in the last 3 years, primarily due to new programs, that appropriations have exceeded the sustainable level.

In the wake of higher oil prices which increased state revenues over 200 percent between 1979 and 1981, state spending expanded dramatically, and a number of new programs were initiated. Precise figures for actual and projected spending for these programs are not yet available. Preliminary figures presented in Table 10 confirm, however, that the most rapid growth has not been in the traditional components of the budget, but rather in a series of newly instituted programs. The operating budget grew by 50 percent, from $1.2 billion to $1.8 billion between 1980 and 1982, and was level between 1982 and 1983. Personnel expenditures have grown less rapidly than either the operating or the total budget. In 1981 they comprised only 19 percent of expenditures (net of special Permanent Fund contributions) compared to 40 percent in 1971. In contrast, debt service expenditures grew more rapidly than the total operating budget.

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[17] A further consideration is that the maturation dates on these investments would need to be chosen so that they could be liquidated in the sequence necessary to fund operations when petroleum revenues declined.

The traditionally defined capital budget is currently about one-sixth the size of the operating budget—the same proportion it maintained in the early 1970s. Real capital expenditures grew slowly through the decade of the 1970s (excluding the 1979 appropriation for rural school construction) but expanded rapidly in response to higher oil revenues.

Permanent Fund contributions, both those constitutionally mandated at 25 percent of royalties and bonuses and the special appropriations in 1981, 1982, and 1983, have been the second most important use of state funds since 1980. (In addition, in 1982, $350 million was placed in a "rainy day" account within the general fund.)

There are three new components of the nonoperating budget. The largest consists of a number of newly established or greatly expanded loan programs, of which the housing mortgage loan program is the largest. Also included in this category are industrial development loan programs, such as the mining loan program and the Alaska Industrial Development Authority. Money allocated to these loan programs can be divided into two categories. A portion of the loan program appropriations represents long-term investments by the state on which a monetary return is expected. Because these loans are made at subsidized rates in order to stimulate certain activities, the return will, in general, be lower than the monetary return expected from funds held in the general fund or invested in the Permanent Fund. The remainder of the appropriations is for the operation of the loan programs and subsidies actually paid and, as such, does not represent an investment. No breakdown between investment and cost of program operation is currently available for these programs.

The second new component of the nonoperating budget consists of a large array of energy-related loans, grants, and transfers. The most important component of these programs is funding for hydroelectric projects throughout the state. As with the housing and other special loan programs, it is not possible to determine the proportions of these programs that are, respectively: investment, subsidy, and operations. The third element of the nonoperating budget is municipal grants for capital projects.

A spending rollback in the direction of a sustainable level would logically concentrate on the reduction of new programs instituted in the last three budgets. Their lower priority is clearly indicated by the fact that they did not exist in earlier years when revenues were lower and fewer programs could be funded. The reduction of some of these programs could be accomplished with relative ease. For example, loan programs for housing are less urgent when housing mortgage rates are falling as is currently the case. Capital expenditures for hydroelectric projects can end when all economically viable projects have been funded. This is not to say that budget cuts will be easy to make, even in cases where the program has served its purpose. Constituencies both in government and the private sector rapidly develop in support of any government program. Still, it is clear that significant rollbacks are possible, particularly in light of the size of the 1980 budget.

CONCLUSIONS

Future state revenues from petroleum may be more or less than have been projected in this analysis, and sustainable revenues, consequently, more or less. Whatever their level, there is a sustainable level of expenditures which, if exceeded, means program cuts will be necessary in future years. If current revenue projections are correct, eventual program cuts would be very large if the present spending limit continues to guide state fiscal policy.

Any discussion of the proper state response to declining petroleum revenues transcends economic considerations. There are at least two broader social questions. The first is, to what extent should the present generation of Alaskans worry about the fiscal problems which the next generation may inherit from us?[18] The more we think they should "fend for themselves," the more we feel we can afford to spend today. The projections in this study indicate, however, that the problems of the "next generation" are only a few years distant.

The second question is, what are the economic, social, and cultural implications of the state acting as a *rentier*[19]—a situation in which the public sector would live primarily off the earnings of the state's assets. There are no precedents for such a fiscal structure among the states. In this, Alaska would be breaking new ground.

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[18] Or, what is the proper rate at which to discount the future?

[19] One who derives a fixed income from returns on investments.

Table 10

Uses of State Revenues[a]
(millions of 1982 dollars)

	GENERAL FUND APPROPRIATIONS													PERMANENT FUND CONTRI-BUTIONS[m]
	TOTAL			OPERATING BUDGET					NON-OPERATING BUDGET					
											New Programs[l]			
	Nominal $[b]	1982 $	Net of Special Perm. Fund Contributions[c]	Total[d]	Personnel[e]	Debt Service[f]	Permanent Fund Dividend[g]	Local Govt. Transfers[h]	Total[j]	Regular Capital Projects[k]	Housing & Business Loans	Energy Loans, Grants, Transfers	Local Govt. Capital Grants	
1971	$299	$701	$701	$610	$282	$35	–	$9	$91	$91	–	–	–	–
1972	314	717	717	649	325	44	–	27	68	68	–	–	–	–
1973	364	804	804	680	366	52	–	28	124	124	–	–	–	–
1974	374	751	751	729	378	53	–	28	22	22	–	–	–	–
1975	528	927	927	800	407	53	–	38	127	127	–	–	–	–
1976	627	1,020	1,020	928	410	57	–	45	92	92	–	–	–	–
1977	735	1,119	1,119	1,023	447	64	–	48	96	96	–	–	–	6
1978	834	1,182	1,182	1,064	481	71	–	45	118	118	–	–	–	41
1979	1,080	1,389	1,389	1,142	500	77	–	47	247	247	–	–	–	108
1980	1,135	1,325	1,325	1,208	534	88	–	53	117	117	–	–	–	402
1981 (pre.)	3,942	4,230	2,887	1,478	558	105	–	122	1,409	214	829	52	–	1,379
1982 (pre.)	4,663	4,663	3,863	1,810	NA	102	148	152	2,053	775	634	429	215	1,209
1983 (est.)	3,175	2,969	2,689	1,861	NA	132	260	127	828	341	299	94	94	597

[a] 1981-1983 data estimated from final appropriations bill as well as *Executive Budget*. Data in different columns may be inconsistent beginning in 1981 because of different sources treating individual items differently.

[b] Office of the Governor, *Executive Budget* 1983, book 2, page 10. 1981 to 1983 from appropriations bills.

[c] Net of special permanent fund contributions in 1981 and 1982 and rainy-day account contributions in 1981.

[d] Office of the Governor, *Executive Budget*, annual, through 1981. Subsequent estimates from appropriations bills.

[e] Total personnel expenditures funded from all operating budget sources. Office of the Governor, *Executive Budget*, annual.

[f] Office of the Governor, *Executive Budget*, 1983, book 2, page 10.

[g] Funds originally appropriated in 1981 were not paid. Funds appropraited in 1982 were paid in 1983. 1983 estimate based upon $1,000 payment per capita.

[h] Sum of shared taxes, municipal assistance, and municipal revenue sharing. Office of the Governor, *Executive Budget*, annual through 1981. Subsequent estimates from appropriation bills.

[j] Total general fund appropriations minus operating budget through 1980. 1979 includes rural school construction appropraition of $141 million. 1981 total includes ANCSA payment of $314 million. Subsequent to 1980 is the sum of non-operating items.

[k] Through 1980 equal to total non-operating budget. Subsequent estimates from appropriations bills.

[l] Compiled from appropriations bills.

[m] Includes special contributions in 1981 and 1982.

* * * *

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* * * *

Dear Reader,

For Alaska, the 1980s may best be characterized as a decade of critical policy choices. Our state is regarded by many to be the most promising, albeit largely unexplored, energy storehouse in the nation. Thus, policies guiding the exploration and development of Alaska's energy resources, mostly oil and gas, will continue to be of prominent concern throughout the eighties. And anticipated shortages in the nation's supply of energy sources ensure that national interest will continue to be an important factor in the state's energy development.

The State of Alaska, eager to achieve a measure of long-term economic security, will focus many of its policy debates on the management of its natural resources and oil wealth: how fast should Alaska exploit its nonrenewable resources and how can it convert oil revenues into sustaining sources of economic activity? Alaska Native organizations, multi-national oil companies, labor unions, and national and local environmental organizations—all of which have a direct interest in these policies—will be active participants in these debates.

It is within this context that the Institute of Social and Economic Research (ISER) pursues its primary goals of studying the important issues confronting the state's economy, population, and social and political institutions and informing both public and private decisionmakers and Alaskans in general of our research efforts.

Lee Gorsuch

Lee Gorsuch
Director

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Effects of Oil Revenues on State Aid to Local Governments in Alaska

INTRODUCTION

Before the recent decline in the world price of oil, the State of Alaska had for several years collected ever-larger revenues from oil production at Prudhoe Bay and had passed on hundreds of millions of dollars in increased aid to its local governments. During the early 1980s, when the national recession was creating serious money shortages for many states and their municipalities, Prudhoe Bay oil meant prosperity for Alaska and its city and borough governments.

The biggest increases in state aid occurred between fiscal years 1980 and 1982, when a sharp rise in the price of oil pushed Alaska's petroleum revenues into the billions of dollars. During that brief period, state aid for local operating expenses nearly tripled, state grants for municipal public works projects grew from a few million to nearly half a billion dollars, and the already substantial state aid to Alaska schools increased even further. In all, Alaska's local governments and schools collected more than a billion dollars in state aid in fiscal 1982, as compared with $350 million in 1980.

This fast growth in state aid, coupled with sharp increases in property values in the more populated areas of the state, allowed Alaska's large municipalities to cut property tax rates substantially while expanding services and adding public facilities. In the sparsely-populated rural areas of the state, where tax bases are generally small, more state money allowed communities to offer services and undertake projects they otherwise could not have afforded.

So much state money flowing into local treasuries meant not only that those treasuries became much larger but also that state dollars made up an increasing percentage of local income in recent years. State dollars accounted for a third or more of the general operating revenues of Alaska's boroughs and largest cities during the early 1980s, as compared with about 15 percent in 1976, shortly before the state began collecting Prudhoe Bay oil revenues. Alaska's small rural cities have always relied heavily on federal and state aid, but in the past few years federal aid increased little (and in some cases was reduced) while state dollars multiplied—so that small communities had more money than ever before, and most of it came from the state.

The oil wealth that made possible such substantial increases in state aid to local governments is, however, already waning because of falling oil prices. Alaska's revenues are especially vulnerable to changes in oil prices because the state relies on oil revenues

This *Review* discusses how billion-dollar state oil revenues in the early 1980s made possible huge increases in state aid to Alaska's local governments, and describes how in the past several years municipalities in Alaska came to rely more and more on such state oil money. The *Review* is based on a chapter from *Alaska's Urban and Rural Governments*, by Thomas A. Morehouse, professor of political science with the University of Alaska's Institute of Social and Economic Research (ISER); Gerald A. McBeath, head of the university's Department of Political Science at Fairbanks; and Linda Leask, research associate, also with ISER. The book, a 1982 study of not only the finances but all aspects of local government in Alaska, will be published this winter by University Press of America.

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FEATURE

Linda Leask	Effects of Oil Revenues on State Aid to Local Governments in Alaska

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much more than do other oil-producing states. In 1982, more than 85 percent of the State of Alaska's general revenues came from taxes on and royalties from Prudhoe Bay oil production. Alaska's fiscal health therefore varies directly with the price of oil. State officials have estimated that each $1 drop in the world oil price costs Alaska $150 million. Oil prices began declining in 1981, and in early 1983 alone dropped several dollars per barrel.

In addition to falling oil prices reducing the state's revenues, production from Alaska's primary revenue source, the Prudhoe Bay oil reservoir, will begin to decline in the mid to late 1980s, further reducing state revenues. So, while it is uncertain just how much oil will sell for in the next few years, it is very unlikely that the state's revenues will again come close to the highs of the past few years.[1]

Less state revenue will mean less money for local governments.[2] In this *Review*, we look at how the state's petroleum wealth translated into prosperity for Alaska local governments during the past several years, but at the same time made them increasingly dependent on a single and volatile source of income. We look first at sources of state and local government income in Alaska before the Prudhoe Bay oil field was developed, and then at how state aid for all Alaska's local governments and school districts increased between fiscal 1976, before the state began collecting oil revenues, and 1982, when those revenues peaked. In the last part of the *Review* we look at the importance of state dollars to Alaska's borough and large city governments and discuss what less state money may mean to Alaska's local governments and school districts in the coming years.

BEFORE PRUDHOE BAY

Until petroleum dollars filled state coffers, state and local governments in Alaska relied heavily on federal money. As recently as 1967, federal dollars made up more than half of the combined revenues of Alaska's state and municipal governments, as compared with 17 percent of revenues for local and state governments nationwide (see Table 1). Alaska depended so much on federal dollars in the early years of statehood because it had no large revenue sources of its own; in fact, many critics of statehood for Alaska had maintained that because of its isolation, small population, harsh climate, high living costs and other factors, Alaska would never develop a strong economic base.

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[1] For a discussion of the factors that have historically influenced oil prices, see "Reflections on the End of the OPEC Era," by Arlon R. Tussing, *Alaska Review of Social and Economic Conditions*, 19,4 (December 1982). An examination of the spending options open to the State of Alaska in the face of declining oil revenues appears in the *Review* of February 1983, "Sustainable Spending Levels from Alaska State Revenues," by Scott Goldsmith.

[2] Another factor that could affect future state aid to local governments is a state spending limit that voters approved in 1982. This limit, which went into effect at the start of fiscal 1984, ties future increases in state spending to increases in state population and costs of living. However, recent analyses indicate that declining oil prices may mean that state revenues will not even reach the designated limit in coming years.

Even in the more populated areas of the state, local tax bases were relatively small in the 1960s and early 1970s. Much of rural Alaska had almost no tax base. Local governments in Alaska looked to the state government to provide services that in other parts of the country were provided in large part by local governments. However, municipal governments in Anchorage and other large urban communities did levy relatively high property taxes for the limited services they provided. The large rural communities in Alaska raised some revenue locally through small property taxes and sales taxes, while some small villages levied sales taxes.

In the mid to late 1970s, construction of the trans-Alaska oil pipeline stimulated economic growth in Alaska. Revenues of Alaska's state and local governments increased, and federal grants came to account for less of total state and local income. By 1980, when the state began collecting very substantial Prudhoe Bay oil revenues, federal grants—while larger than they had ever been before—made up only about 12 percent of the combined revenues of Alaska's state and local governments.[3] At the same time, state and local governments nationwide were relying more rather than less on federal money; in 1980 federal dollars accounted for 22 percent of state and local revenues around the country.

Municipal governments in Anchorage, Fairbanks, Juneau, and other urban areas of Alaska were able to increase services somewhat as their tax bases grew. Growing populations, rising real estate values, and increased economic activity—brought on directly or indirectly by pipeline construction—broadened the tax bases of many local governments in Alaska in the late 1970s.

Then, beginning in 1980, the state government sharply increased aid to local governments, and a new era of local government finances began. Table 2 shows why the State of Alaska could afford to be generous with its local governments in recent years. In 1978, soon after oil began moving through the trans-Alaska pipeline and before the price of oil started a dramatic climb, the State of Alaska's own revenues—excluding federal grants—stood at about $785 million; slightly more than half those revenues were from petroleum. By 1980, when the price of oil was climbing, the state's own general revenues stood at $2.6 billion, with almost 90 percent of that total from petroleum taxes and royalties. The state

Table 1

Revenue* Sources, State and Local Governments, Alaska and the U.S. Average, Selected Fiscal Years, 1962-1980

(Percent Distribution)

Combined State & Local Govt. Revenues	1962		1967		1974		1977		1980	
	U.S.	Alaska	U.S.	Alaska	U.S.	Alaska	U.S.	Alaska	U.S.	Alaska
State Sources	41%	47%	41%	33%	43%	44%	42%	62%	44%	74%
Local Sources	46	19	42	15	37	22	36	17	34	14
Federal Sources	13	34	17	52	20	34	22	21	22	12
All Sources	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

*Includes all revenues except utility revenue, liquor store revenue, and insurance-trust revenue.

Sources: U.S. Department of Commerce, Bureau of the Census, *Census of Governments*, 1962, 1967, and 1977; and *Governmental Finances*, 1973-74 and 1979-80.

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[3] Although federal grants in the early 1980s made up a smaller part of state and local revenues in Alaska than in other states, direct federal spending is still very important to Alaska's economy. In 1980, the Department of Defense and other federal agencies supplied one in five jobs in Alaska—three times the national average.

took in more than $4 billion in general revenues in 1982.[4]

In short, Prudhoe Bay oil transformed Alaska almost overnight from a state that looked to the federal government for a large share of its modest revenues to a state with billion-dollar revenues of its own.

STATE AID TO LOCAL GOVERNMENTS

The State of Alaska provides three main kinds of aid to local governments: aid for general government operating expenses, grants for public works projects, and aid for schools. (We do not consider various smaller or special state aid programs here.) All boroughs, and first- and second-class cities inside and outside boroughs, can qualify for operating and capital projects aid. Some nonprofit organizations and Native governments can also receive state aid through municipalities. Aid to schools goes to both urban and rural school districts.

It is important to note here that all major state aid programs are paid for through annual legislative appropriations. Regardless of how much aid municipalities may be entitled to under state law, the size of the annual appropriations is at the discretion of the legislature. Although the Alaska Legislature liberalized the laws governing municipal aid programs in the early 1980s, there are already indications that in the face of declining oil revenues the legislature may simply appropriate less than is needed to pay full entitlements under some programs.[5]

Another point to keep in mind is that state money which goes directly to local governments is only part of that spent in Alaska's communities. The state itself still provides some basic services, particularly in rural areas, and undertakes public works projects. Just as oil wealth meant more state aid for municipalities in the past few years, it also meant that the state itself spent more in various ways, particularly for capital projects.

State Aid for Operating Expenses

The two primary state programs that help local governments pay for public services and other operating costs are revenue sharing and municipal assistance. The revenue-sharing program is administered by the Department of Community and Regional Affairs, and the municipal assistance program by the Department of Revenue. The revenue department also administers a program under which a number of small taxes are shared with the local jurisdictions in which they are collected; this shared tax program has in recent years been dwarfed by the municipal assistance and revenue-sharing programs.

Table 2

General Fund Revenues,[a] Petroleum and Other, State of Alaska, Selected Fiscal Years, 1970-1983
(in millions of dollars)

Year	Petroleum Revenues[b]	Other Revenues[c]	Total General Revenues	Petroleum Revenues as Percentage of Total
1970[d]	$ 927	$140	$1,067	87%
1972	47	172	219	21
1974	79	176	255	31
1976	386	324	710	54
1978	430	357	787	55
1980	2,254	379	2,633	86
1981	3,299	419	3,718	89
1982	3,574	534	4,108	87
1983[e]	3,048	520	3,568	85
1984[e]	2,477	328	2,805	88

[a] These figures include only unrestricted general fund revenues—that is, revenues the State of Alaska collects from its own sources, exclusive of federal grants, and which can be used for any government purpose. Almost all state revenues go into the general fund; there are a few special funds, all of which are small, except the permanent fund. The permanent fund, established in 1976, had a balance of approximately $3 billion in 1982. State law requires that 25 percent of monies the state currently collects in petroleum royalties and bonuses from petroleum lease sales be automatically deposited in the permanent fund; these mandatory contributions to the permanent fund are not included in the above figures.

[b] Petroleum revenues are largely made up of corporate taxes on petroleum income, severance taxes on petroleum production, royalties from the state's share of Prudhoe Bay oil, and bonuses from petroleum lease sales.

[c] Investment earnings currently make up about half of other revenues; miscellaneous taxes and fees make up most of the balance. Until recently, other revenues also included individual income taxes and gross business receipts taxes; the individual income tax was eliminated in 1980, and the business receipts tax was repealed in 1978.

[d] In fiscal year 1970, the State of Alaska collected more than $900 million from sale of petroleum leases at Prudhoe Bay.

[e] Department of Revenue estimates, subject to change with changes in the price of oil and other factors.

Source: State of Alaska, Department of Revenue, *Revenue Sources*, quarterly.

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[4] The general revenue figures in Table 2 exclude not only federal grants, but also substantial contributions the State of Alaska has made every year since 1977 to the permanent fund, a special fund established for investment of a portion of Alaska's petroleum revenues. The permanent fund had a balance of $3 billion in late 1982.

[5] See the discussion on p. 9 about 1983 cutbacks in appropriations for school debt reimbursement to city and borough schools.

Between fiscal years 1980 and 1982, state aid under the revenue-sharing, municipal assistance, and shared tax programs increased from $41 million to $150 million; such operating aid had totalled $21 million in 1976 (see Table 3). Looked at another way, the state government paid Alaska's cities and boroughs $51 in operating aid for each resident in 1976, $93 in 1980, and $336 in 1982. If we translate these per capita figures into 1976 dollars (and thus eliminate the effects of price inflation between 1976 and 1982), we find that real per capita operating aid grew modestly between 1976 and 1980, but tripled between 1980 and 1982 (see Table 4).

Revenue Sharing. The state established this program in 1969 to encourage local governments to provide police protection, road maintenance, and other services previously provided by the state throughout much of Alaska. Originally the program paid local governments per capita amounts for providing a number of services and additional money for maintaining roads and operating hospitals.

In 1980, partly in response to criticisms that the existing system unduly favored large municipalities, the state legislature eliminated per capita payments and substituted a formula under which revenue-sharing payments would instead be determined by a municipality's population, tax base, and rate of local taxation.[6] Also, the legislature established for the first time a minimum annual revenue-sharing payment of $25,000 for the smallest municipalities—which under the old system might have qualified for as little as $5,000 annually. The revised revenue-sharing system was intended to distribute state dollars more equitably, because it takes into account a municipality's ability to raise its own revenues.

Table 3

Major State Operating Aid to Municipalities[a] Selected Fiscal Years, 1976-1983

(in millions of dollars)

	1976	1980	1981	1982	1983
Revenue Sharing	$14	$27	$52	$56	$56
Municipal Assist.[b]	—	11	57	87	71[c]
Shared Taxes	7	3	7	7	10
Total	$21	$41	$116	$150	$137

[a] See text for description of these programs.

[b] The state legislature established the municipal assistance program in 1978; this program replaced the much smaller state aid program which had shared business receipts taxes with municipalities.

Sources: State of Alaska, Department of Revenue, municipal assistance spread sheets; Department of Community and Regional Affairs, *Revenue Sharing*, annual reports; and Legislative Finance Division, *Summary of Appropriations*, annual.

Table 4

Per Capita State Operating Aid[a] to Local Governments

	Municipal Population[b]	Total Aid	Per Capita Aid	Per Capita Aid (in 1976 $)[c]
1976	411,495	$21 million	$ 51	$ 51
1980	442,332	41 million	93	68
1982	446,414	$150 million	336	211
1983	459,806	$137 million	298	N/A

[a] Includes state revenue sharing, municipal assistance, and shared taxes.

[b] Population figures as reported by the Alaska Department of Community and Regional Affairs; excludes persons living in unincorporated areas outside organized borough—roughly 5 percent of the state population in 1980.

[c] Figures for 1980 and 1982 deflated by price increases since 1976 as measured by the Anchorage consumer price index.

In fiscal 1976, cities and boroughs in Alaska collected $14 million in state revenue-sharing payments. By fiscal 1980, total state revenue-sharing payments had risen to $27 million. The most dramatic increase in revenue sharing occurred between 1980 and 1981, when payments to communities increased from $27 million to $52 million—a jump of more than 90 percent. In fiscal 1982, state revenue-sharing payments totalled $56 million, and appropriations for fiscal 1983 remained at that level (see Table 3).

Municipal Assistance. This program was created in 1978 and paid for with a portion of the state's corporate petroleum income taxes. Payments under the program are largely based on population.

The municipal assistance fund at first replaced a relatively modest state aid program that was eliminated in 1978 when the business receipts tax was repealed. In fiscal 1980, the second year of the program, Alaska's municipalities collected about $11 million in municipal assistance (see Table 3). But when the price of oil—and thus the state's corporate petroleum taxes—increased sharply between 1979 and 1981, legislative appropriations for municipal assistance mushroomed overnight. Between fiscal 1980 and 1981 alone, municipal assistance payments more than quadrupled, jumping from $11 million to $57 million. The following year, fiscal 1982, the municipal assistance fund stood at $87 million.

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[6] **Although it eliminated per capita payments for services, the legislature retained payments for miles of road and numbers of hospital beds maintained locally; in 1982, state law allowed municipalities to collect $2,500 for each mile of road maintained and $1,000 for each hospital bed.**

The law establishing the municipal assistance program stated that the legislature wanted local governments to use this increased state aid for tax relief, although municipalities were not actually required to reduce their taxes in order to receive municipal assistance. Most boroughs and cities did reduce taxes, some more than others.

Municipal assistance quickly became an important part of local revenues, but a recent change in state tax laws, together with falling state oil revenues, have made the future size of the municipal assistance program uncertain. In 1981, in response to legal challenges to the state's method of measuring taxable petroleum income, the Alaska Legislature changed the state's tax laws, essentially reducing corporate petroleum income taxes and increasing severance taxes. Because the municipal assistance program is paid for with a portion of corporate income taxes, this tax change reduced the legislative appropriation for the program from $87 million in fiscal 1982 to $71 million in fiscal 1983. Municipal officials have asked the legislature for a $25 million supplemental appropriation for the current year and for revisions in the municipal assistance program that would make future appropriations less subject to changes in tax laws.

Shared Taxes. The state government levies a number of taxes that it subsequently shares with local jurisdictions where the taxes are collected. The state currently shares with local governments all or part of taxes it collects on raw fish, utility cooperatives, aviation fuel, liquor licenses, and gaming devices. Before it was repealed in 1978, the gross business receipts tax was the largest of these shared taxes. All together, these shared taxes amounted to about $7 million in 1982 and about $10 million in 1983.

Capital Grants to Municipalities

At the start of the 1980s, the Alaska Legislature established the municipal grants program, under which the legislature awards grants for public works projects directly to local governments. Under this grant system, the receiving government must agree to use the money for specific projects, and to pay operating and maintenance costs of the completed facilities.

Nearly a billion dollars in state grants for municipal public works projects went to Alaska's boroughs and cities in the 3-year period from fiscal 1981 through 1983, with half that total in fiscal 1982 alone (see Table 5). These municipal grants amounted to about $54 for each resident of local jurisdictions in 1980, more than $1,000 per capita in 1982, and about $630 per municipal resident in 1983 (see Table 6).

The State of Alaska's capital budget was less than $100 million annually throughout most of the 1970s, and in some years was made up largely of federal highway grants. There were few state grants for capital projects of borough and city governments in Alaska before fiscal 1980. The larger municipalities financed their capital projects mainly through general obligation bonds; small municipalities usually couldn't afford public works projects. What little state money was available for municipal public works projects was passed through various state agencies rather than appropriated directly to borough and city governments.

Then, when the rising price of oil swelled the state treasury in the early 1980s, the state legislature appropriated increasing amounts for municipal projects and began awarding grants directly to cities

Table 5

State Capital Grants to Municipalities, Selected Fiscal Years, 1974-1983

(in millions of dollars)

	1974	1976	1980	1981	1982	1983
Total Capital Appropriations[a]	$94	$30	$211	$1,043[b]	$1,346	$843[d]
Municipal Grants	N/A[c]	N/A[c]	24[c]	$205	$497	$289[d]
Municipal Grants as a % of Total Appropriations	N/A[c]	N/A[c]	12%[c]	20%	37%	34%

[a] Includes all appropriations in the general appropriations act and any special or supplemental appropriations in any given year.

[b] This total excludes $292 million the State of Alaska paid to Alaska Native corporations under terms of the Alaska Native Claims Settlement Act in fiscal year 1981.

[c] Before fiscal 1980, the state legislature did not make capital appropriations directly to municipalities but rather through various state agencies. Such appropriations through state agencies are difficult to trace, and in any case capital grants to municipalities were small before 1980.

[d] The final figures for fiscal 1983 will probably be higher. The state legislature in early 1983 was considering a $200 million supplemental appropriation, a portion of which will go to municipalities for capital projects.

Source: State of Alaska, Legislative Finance Division, *Summary of Appropriations*, annual.

Table 6

Per Capita State Capital Grants[a] to Local Governments

	Muni. Pop.[b]	Total Aid	Per Capita Aid	Per Capita Aid (in 1976 $)[c]
1976	411,495	–	–	–
1980	442,332	$24 million	$ 54	$ 39
1982	446,414	$497 million	1,113	702
1983	459,806	$289 million	630	N/A

[a] Includes only capital grants awarded to local governments does not include the substantial monies the state itself spends for capital projects in boroughs and cities.

[b] See note b, Table 4.

[c] See note c, Table 4.

and boroughs. In fiscal 1980, the first year under the direct municipal grant system, the state legislature appropriated about $25 million for municipal projects. By the following year, when the state general fund was growing very rapidly, the legislature appropriated more than $200 million—almost ten times more than in the previous year—for local government projects (see Table 5).

State revenues peaked in fiscal 1982. In that year the legislature not only made appropriations for specific municipal projects, it also established a special grants program. Over a period of 2 years, fiscal 1982 and 1983, local governments were to be paid per capita grants to use for capital projects or social services.[7] Unlike other capital grants, which are tied to specific projects, these special grants could be used for projects the municipalities themselves chose. Together, specific project grants and per capita grants totaled nearly half a billion dollars in fiscal 1982.

Municipal grants of $290 million in fiscal 1983[8] were substantially lower than in the previous year, but were still on a scale undreamed of by local officials as recently as 1979. Many municipalities were in fact hard-pressed to deal with these massive increases in public works money, and some of the larger municipalities established special offices to handle these millions of capital grant dollars.

Grants to municipalities accounted for about one-third of the State of Alaska's capital budget from fiscal 1981 through 1983, a period when the state legislature appropriated more than $3 billion for public works projects around Alaska (Table 5).

Combined state operating and capital aid to local governments around the state amounted to more than $1,400 per municipal resident in fiscal 1982, the peak year of state aid, as compared with about $150 per resident in 1980 and $51 in 1976. If we translate all these figures into 1976 dollars, we find that real per capita state operating and capital aid to Alaska's municipalities increased from $51 in 1976 to $107 in 1980 and to about $915 in 1982 (see Tables 4 and 6). Aid for both operating and capital costs declined in fiscal 1983.

Aid to Alaska Schools

The state government pays a substantial share of the costs of building schools in Alaska and most of the costs of operating them. The major kinds of state aid to schools are the school foundation program, which is the central source of operating money for all Alaska schools; state aid for transporting students, for special and vocational education and other special expenses; and state reimbursement of city and borough schools for a large share of the costs they incur in building schools.

Broadly speaking, there are two kinds of school districts in Alaska: (1) districts within boroughs or within first-class or home-rule cities outside boroughs, and (2) districts in areas where there are only second-class cities or unincorporated communities. These latter districts are known as Regional Education Attendance Areas (REAAs).[9]

Roughly 85 percent of public school students in Alaska attend borough and city schools. By far the largest share of these students attend borough schools and a smaller share attend schools in a dozen small city districts in rural areas outside boroughs and in a handful of larger city districts outside boroughs in the more urban areas of the state. The remaining 15 percent of students attend schools in the twenty-one REAAs that cover most of the region outside organized boroughs.

Borough and city school districts pay a portion of the costs of operating their schools; REAAs do not, because historically, rural areas have lacked tax bases. A small part of the operating costs of both kinds of districts is paid for by federal aid to education. Borough and city districts—particularly the larger districts—typically sell general obligation bonds to pay for building schools, and the state reimburses them for a substantial share of the costs of building new schools. The state itself builds schools in the rural districts.

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[7] Originally, municipalities were to be paid $1,000 per resident, but in final appropriations, this per capita money was reduced from about $400 million to $295 million, so actual grants were less than $1,000 per person.

[8] The 1983 legislature also approved a $250 million supplemental appropriation for capital projects in fiscal 1983; some portion of this additional money will go to municipalities.

[9] There are also a few schools still operated by the federal Bureau of Indian Affairs in rural Alaska, but these are scheduled to be incorporated into the REAA system by the middle of the decade.

State operating aid to Alaska's schools increased from about $170 million in fiscal 1976 to $275 million in 1980 and reached nearly $500 million in 1983 (Table 7). This operating aid amounted to an average $1,748 per student of borough and city schools and $2,418 per student of REAAs in 1976; by 1982, per student operating aid in borough and city schools had risen to $3,178 and to $8,724 per student of REAAs. If we discount these figures for price inflation over that 6-year period, we find that real per capita aid to students of borough and city schools increased about 15 percent and per student aid to REAAs more than doubled between 1976 and 1982 (Table 8).

School Foundation Program. This program, administered by the state Department of Education, is the central source of operating money for all Alaska school districts, with payments based on the number of students per district and adjusted for districts with higher living costs. In 1980 the Alaska Legislature made changes in the foundation program that essentially increased state payments to all districts. One of the main changes is that basic foundation payments to city and borough districts are no longer reduced by local contributions. In fact, under the revised system, school districts whose per-student local contribution is below the state average can qualify for additional foundation money.

Table 7

Major State Aid to Alaska Schools,[a] Selected Fiscal Years, 1976-1983

(in millions of dollars)

	1976	1980	1981	1982	1983
School Foundation Prog.	$154	$217	$217	$350	$417[b]
Other Operating Aid	15	59	61	61	66
Total Operating Aid	169	276	278	411	483
Reimbursement for School Construction Debt	9	24	38	38	36
Total	$178	$300	$316	$449	$519[b]

[a] Includes aid to Alaska borough and city school districts and Regional Education Attendance Areas (REAAs). See text for description of these aid programs.

[b] Includes a $25.5 million supplemental appropriation approved by the legislature midway through fiscal 1983.

Sources. State of Alaska, Department of Education, annual reports; Legislative Finance Division, *Summary of Appropriations*, annual.

Table 7 shows that school foundation appropriations increased about 170 percent between 1976 and 1980, and about 90 percent between 1980 and 1983. This large increase occurred because a number of new schools were built during the late 1970s and early 1980s, particularly in rural Alaska, and because the state liberalized its foundation payments. Between fiscal 1981 and 1982 alone, foundation appropriations increased more than 60 percent. The state paid more than $417 million to urban and rural school districts under this program in 1983.[10]

Other Operating Aid. This category of aid to schools includes payments for a number of special operating costs; the largest of these are for student transportation and for special and vocational education programs. The state paid Alaska districts about $15 million for these kinds of costs in 1976. By fiscal 1983, state aid in this category had more than tripled, reaching $66 million (see Table 7).

The various kinds of state aid described above pay almost all the operating costs of schools in the REAAs, with federal money making up the balance. The portion of operating costs that borough and city districts pay through local taxes varies widely, with some districts contributing as much as 35 percent and others as little as 3 percent of the operating revenues of their schools in recent years. In 1981, borough and large city districts paid on average about 24 percent of the operating costs of their schools, with the state paying 73 percent and the federal government the remaining 3 percent.[11] It is likely that in 1982, when the liberalized foundation program payments were fully in effect, the state paid a higher proportion of the operating costs of borough and city schools.

Table 8 shows how overall state operating aid to schools in recent years has translated into aid per student. In general, state operating aid per student is higher in REAAs than in borough and city districts. This discrepancy occurs because costs in rural Alaska are higher than in more urban areas and because the state pays a higher proportion of operating costs in

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[10] The original foundation program appropriation for fiscal 1983 was $391.7 million; a supplemental appropriation of $25.5 million midway through the fiscal year brought the total to $417 million.

[11] ISER calculations, based on Department of Education annual reports and municipal financial reports.

Table 8

Average State Operating Aid per Student,[a] Alaska School Districts, Fiscal Years 1976, 1980, 1982

	(in current dollars)			(in 1976 $)[b]		
	1976	1980	1982	1976	1980	1982
City & Boro. Districts.	$1,748	$2,655	$3,178	$1,748	$1,939	$2,005
REAAs	2,418	6,986	8,724	2,418	5,102	5,504
All Districts	1,936	3,259	3,935	1,936	2,380	2,482

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[a] As measured by average daily membership figures. During the 1981-82 school year, average daily membership in city and borough schools was 70,683 and in REAAs, 11,181. These figures do not include reimbursement for school construction debt of borough and city schools.

[b] Figures for 1980 and 1982 deflated by price increases as measured by the Anchorage consumer price index; prices recorded by that index increased 36.9 percent between 1976 and 1980, and 58.5 percent between 1976 and 1982.

Sources: Alaska Department of Education, annual reports; and University of Alaska, Center for Northern Educational Research.

the REAAs, which levy no local school taxes. The table shows that in 1976, soon after the REAA system was established, state operating aid amounted to about $2,418 per student in the rural districts and $1,748 per student in the borough and city districts. By 1980, the state paid REAAs $6,986 and borough and city districts $2,655 in operating aid per student. In 1982, when the liberalized foundation program payments were in effect, REAAs collected $8,724 in state aid per student and city and borough districts $3,178 per student; per student payments to REAAs that year were about 175 percent larger than per student payments to city and borough schools.

Part of the increase in per student payments between 1976 and 1982 was due simply to inflation. Table 8 also shows how real (adjusted for inflation) payments changed over that period. With all figures in 1976 dollars, we find that per student state operating aid to REAAs more than doubled during those 6 years, while per student aid to city and borough schools increased about 15 percent.

Reimbursement for School Construction Debt. The State of Alaska builds schools in the REAAs; city and borough districts typically sell general obligation bonds to finance construction of their new schools, and the state reimburses local jurisdictions for most of the bond costs. This aid does not mean that the state takes on the debt obligations of local districts; local governments themselves are still responsible for paying principal and interest on bonds they sell—the state reimbursements are annual appropriations the legislature makes from operating funds.

In the early 1970s, the state reimbursed borough and city districts for half the costs they incurred in financing school construction; this proportion was increased several times during the decade. Table 7 shows that in 1976 the state reimbursed borough and city districts $9 million for school construction debt. In the most recent fiscal years, local governments received more than $35 million annually for costs they had incurred in building schools. This substantial increase resulted from the increased school construction debt of local governments and the increased proportion of that debt paid for by the state in recent years.

In 1982, the Alaska Legislature increased from 80 to 90 percent the amount the state would pay local governments for debt service on school construction bonds sold since 1977. (The legislature had previously agreed to reimburse local governments for 100 percent of bond costs incurred before 1977.) Voters in several urban areas approved sales of millions of dollars in general obligation bonds to finance school construction, in the belief that the state would pay 90 percent of that debt. However, in fiscal 1983 the state legislature appropriated only enough money to cover 63 percent of local school construction debt. A number of boroughs increased property taxes to cover this shortfall. In fiscal 1984 the legislature did agree to reimburse school districts for 90 percent of their school construction debt—but at the same time stipulated that state reimbursement for such debt incurred in the future would be limited to 50 percent.

This move to limit state aid for local school construction costs may be a harbinger of things to come in other kinds of state aid to local governments.

Summary of Changes

Table 9 summarizes the overall changes in the three major categories of state aid to local jurisdictions in Alaska between fiscal years 1976 and 1983. The broad changes were:

1. State aid for local operating costs, capital projects, and schools tripled between fiscal years 1980 and 1982, growing from $364 million to more than a billion dollars. To put this number in perspective, recall that in 1976 the State of Alaska's entire income—from its own sources and from federal revenues combined—was less than $1 billion.

2. State grants for municipal public works projects, which were almost nonexistent before 1980, mushroomed in the three most recent years, totalling more than $900 million.

3. In 1976, 90 percent of major state aid to municipalities was for schools; in the three most recent years, with very rapid growth in state aid for general government operating and capital costs, aid for schools made up only about half of state aid to local jurisdictions.

4. The proportion of state general revenues devoted to local government and school costs roughly doubled between 1980 and 1982. In 1980, state aid to municipalities and school districts accounted for about 14 percent of the state's general revenues. By 1982, rapid growth in state aid—particularly in aid for public works projects—meant that about 27 percent of state general revenues went to local jurisdictions. It is interesting that—as Table 9 shows—in 1976, when state revenues were much smaller, roughly the same percentage of those revenues went to local jurisdictions as in 1982; in 1976, however, almost all state aid was for schools.

CHANGES IN LOCAL GOVERNMENT

Up to this point, we have shown how state money for various kinds of municipal aid increased as the state's petroleum revenues grew. In this section, we look at some of the effects on Alaska's local governments of petroleum development over the past decade, and of increased state aid in the past several years.

Table 9

Major State Aid to Alaska Schools and Local Governments, Selected Fiscal Years, 1976-1983
(in millions of dollars)

	1976	1980	1981	1982	1983
Aid to Alaska Schools[a]	$178	$299	$315	$ 449	$520
Aid to Local Govts.					
Operating Aid[b]	22	41	116	150	137
Capital Grants	N/A	24	205	497	289
Total Aid to Schools & Local Governments	$200	$364	$636	$1,096	$946
Aid to Schools & Local Govts, as % of State General Revenues[c]	28%	14%	17%	27%	28%

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[a] See Table 6 for categories of state aid to schools.

[b] See Table 4 for major state aid programs for local governments.

[c] See Table 3 for general fund revenue figures.

Sources: State of Alaska, Legislative Finance Division, *Summary of Appropriations*, annual; Department of Revenue, SB168 community grants logs, 1982 and 1983; and Department of Revenue, *Revenue Sources*, quarterly.

Growing Tax Bases

Alaska's population increased about 45 percent between 1970 and 1982, with most of that growth concentrated in Anchorage and other urban areas of southcentral, interior, and southeast Alaska. About eight out of ten of the approximately 450,000 Alaskans live in the state's eleven organized boroughs and in a handful of urban communities outside boroughs. These larger municipalities have historically paid a substantial share of local government costs through property and other taxes. (The remaining 15 to 20 percent of Alaskans live in small, rural municipalities or in unincorporated areas that rely primarily on state and federal aid.)

Growing populations, rising real estate values, and increased economic activity brought on directly or indirectly by petroleum development broadened tax bases in urban Alaska in recent years. Construction of the trans-Alaska pipeline created an economic boom in the mid-1970s, and state spending of large petroleum revenues has fueled economic growth in the early 1980s.

Table 10 shows growth in assessed value of property in Alaska's boroughs from 1976 through 1982. The smallest increase in property value in any borough during that period was 97 percent in the Haines Borough, and the greatest increase was 360 percent in the North Slope Borough, where the Prudhoe Bay oil field and related facilities are located. Among other boroughs, property values commonly increased 150 percent or more over those 6 years.

A significant share of the increase in property values was due simply to price inflation during that period. However, if we deflate these figures to take inflation into account, we see that the real increases in property values in most boroughs (column five of Table 10) were still substantial. Real increases (as measured in 1976 dollars) of between 50 and 100 percent in the value of assessed property were common to most boroughs between 1976 and 1982.

Increased Employment

Figure 1 provides a good measure of municipal government growth in Alaska during the era of petroleum development, by comparing increases in numbers of local, state, and federal government employees between 1970 and 1982. During that period, when the state population increased about 45 percent, local government (including school district) employment nearly tripled, state employment grew about 80 percent, and federal employment changed little.

In 1970, local governments and school districts in Alaska employed about 8,000 persons, as com-

Table 10

Property Valuation,[a] Alaska Boroughs, 1976, 1981, 1982
(in millions of dollars)

	1976	1981	1982	Percent Increase 1976-1982	Real[b] Percent Increase 1976-1982
			Unified and Home-Rule Boroughs		
Municipality of Anchorage	$3,740	$8,003	$10,612	+184%	+79%
City & Borough of Juneau	326	859	1,038	+218	+100
City & Borough of Sitka	151	382	421	+178	+76
North Slope Borough	1,794	6,705	8,269	+361	+191
			Second- and Third-Class Boroughs		
Bristol Bay Borough	$ 26	$ 85	$ 88	+238%	+113%
Fairbanks North Star Borough	1,237	2,607	2,996	+142	+53
Kenai Peninsula Borough	909	2,582	2,978	+228	+106
Ketchikan Gateway Borough	245	545	667	+172	+72
Kodiak Island Borough	146	378	438	+200	+89
Matanuska-Susitna Borough	453	1,123	1,203	+166	+67
Haines Borough	36	64	71	+97	+25

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[a] Full value determination, including oil and gas property, as reported by the state assessor.

[b] Deflated by the increase in the Anchorage Consumer Price Index from 1976 through 1982; during that period, prices recorded by the index increased 58.5 percent.

Source: State of Alaska, Department of Community and Regional Affairs, *Alaska Taxable*, 1976, 1981, 1982.

pared with 10,000 state and 17,000 federal civilian workers. Ten years later, in 1980, nearly 21,000 Alaskans worked for municipal governments and school districts, as compared with about 15,500 state employees and about 18,000 federal workers.

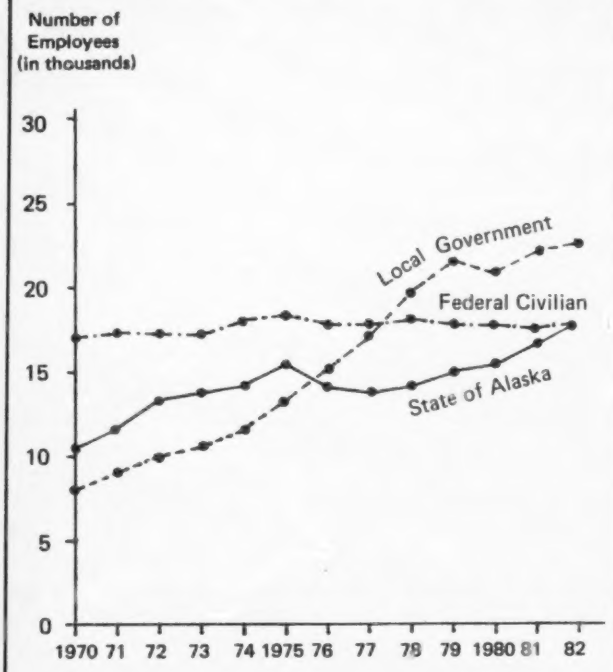
The sharp increase in local government employment in urban Alaska in the last half of the 1970s was due to the larger populations and tax bases able to support larger government organizations. In rural Alaska such increases in government employment were primarily due to creation of the REAAs—large, locally-controlled rural school districts. Establishment of these REAAs meant not only transfer from state to local employment of persons who had formerly worked for the state-operated rural school system (which the REAAs replaced) but also the addition of many new employees to staff the substantial number of new schools built in rural Alaska since 1976.

After 1980, large infusions of state money for both urban and rural areas helped boost local government employment even further. Between 1980 and 1982, local government employment jumped from 21,000 to 23,000. During the same brief period, state employment grew about 15 percent, increasing from 15,500 to 18,000, while federal employment remained at about 18,000, the level where it had been for the past decade. (These figures show why federal employment is still so important in Alaska, even though the number of federal jobs increased little in recent years: it is a stable source of a large number of jobs, which are largely unaffected by the historic ups and downs of Alaska's economy.)

Increased Services

Another measure of growth in local government in Alaska is the level of government services now provided locally: local governments, particularly boroughs, are providing substantially more services now than they did in the early 1970s.

In most of Alaska's boroughs, few services except education are provided throughout the entire borough. Rather, most services, such as road maintenance, police and fire protection, and water and sewer systems, are provided only to limited service areas,



Source: ISER, Man-in-the-Arctic Program.

Figure 1. Government Employment in Alaska, 1970-1982

where residents have approved establishment of the services and have voted to pay for them (at least partially) through local taxes. (In boroughs where separate city governments also exist, cities can be in effect service areas, providing certain services only to those living within city boundaries.)

Therefore, growth in the number of borough service areas and expansion of services in existing service areas are measures of growth in local government. Between 1976 and 1982, the overall number of service areas in Alaska's organized boroughs increased from 55 to 145—a jump of about 170 percent. Most of this increase occurred in the Fairbanks, Mat-Su, Kenai Peninsula, and Anchorage boroughs. Growth in borough service areas had already begun in the late 1970s, but increased state money after 1980 intensified the trend. Services most commonly established in the new service areas were road maintenance and fire protection—costs of which the state has heavily subsidized in recent years.

More and improved services have also been provided in existing cities and service areas in recent years. The Municipality of Anchorage, for example, has extended police and fire protection, the public bus system, and water and sewer systems to more areas of the municipality in the past several years. Other boroughs have added or expanded public landfills, libraries, and emergency medical services. And the North Slope Borough, Alaska's most recently established borough, has undertaken a massive capital improvements program to provide public safety, sanitation and utility systems, roads, and other basic services in all borough villages. (See discussion below of the North Slope Borough.)

Municipal Debt

Another measure of local government growth over the past decade is growth in general obligation debt of municipalities. Municipalities incur such debt by selling general obligation bonds to finance construction of public facilities. As Table 11 shows, bonded debt of Alaska's cities and boroughs grew rapidly between 1970 and 1982, increasing from $149 million to $1.3 billion. This amounted to an 800-percent increase over 12 years, or an annual average increase of about 20 percent. However, a large share of the increase in municipal debt over the past few years is attributable to just one municipality—the North Slope Borough, whose bonded debt grew from $26 million in 1976 to nearly $600 million in mid 1982 and nearly $1 billion by early 1983. In 1982, the North Slope Borough's debt alone ac-

Table 11

Bonded Debt,[a] Alaska Municipalities, Selected Years, 1970-1982
(in millions of dollars)

	All Cities & Boroughs	North Slope Borough	North Slope Debt as % of Total Municipalities
1970	$ 149	–	–
1972	262	–	–
1976	420	$ 26	6%
1980	827	257	31
1981	1,091	487	45
1982[b]	1,316	587	45
1983	N/A	987	N/A

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[a] General obligation bonded debt.

[b] As of July 1982.

Source: Alaska Department of Community and Regional Affairs, *Alaska Taxable*, annual.

Table 12

Borough[a] General Revenues[b] by Source, Fiscal Years 1976 and 1981

	1976 (in thousands of dollars)	1976 (Percentage)	1981 (in thousands of dollars)	1981 (Percentage)
Local				
Taxes	$93,191	71%	$108,567	42%
Other	8,024	6	64,855	25
Total	$101,215	77%	$173,422	67%
State	21,110	16	71,318	27
Federal	8,844	7	15,635	6
Total	$131,169	100%	$260,375	100%

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[a] This table shows aggregate borough general revenues for all Alaska boroughs except the North Slope Borough; revenues for that borough are shown separately in Table 8A.

[b] To make general revenues consistent among borough governments, we have included the following local sources: taxes levied for general government purposes; interest income from investments; charges for services and other local fees. State and federal sources include all revenues for general government operations. Included in federal sources is federal revenue sharing, which is sometimes classified as special revenue but which can be used for a variety of government purposes. Not included here are special and enterprise revenues, revenues for capital projects, and federal and state aid for education.

Source: Alaska borough governments, annual financial reports, fiscal years 1976 and 1981.

counted for 45 percent of all municipal debt in Alaska. We do not have 1983 figures for all cities and boroughs, but the borough's proportion of total municipal debt will undoubtedly be higher this year, since it now owes nearly $1 billion.

If we eliminate the large debt of the North Slope Borough, we find that debt of other cities and boroughs increased about 400 percent, or slightly more than 12 percent on an annual average, between 1970 and 1982. Much of this debt among boroughs other than the North Slope is for school construction, but over the past decade, cities and boroughs also took on some debt for roads, fire and police buildings, water and sewer systems, libraries, hospitals, airports, and parks and recreation facilities.

An interesting aspect of the municipal debt figures for the most recent years is that, excluding debt of the North Slope Borough, municipal debt increased modestly between 1980 and 1982, when hundreds of public works projects of all descriptions were underway in localities around the state. This occurred because almost all municipal projects were being financed entirely or in large part with state money. As Table 5 shows, municipal grants totalling nearly $1 billion went to municipalities around the state from fiscal 1980 through 1983. Most general obligation debt that municipalities did incur in the early 1980s was for school construction.

General Revenues of Boroughs and Large Cities

Yet another indication of growth and change among local governments is change in amounts and sources of municipal income.

Tables 12 and 13 show general revenues by source for boroughs and for large cities inside and outside boroughs in 1976 and 1981. Excluded from these tables are the revenues of the North Slope Borough and the City of Valdez, which are shown separately in Tables 14 and 15. The North Slope Borough and Valdez represent special cases in Alaska, in that they have benefited from petroleum develop-

Table 13

General Revenues[a] of Selected Home-Rule and First-Class Cities,[b] by Source, Fiscal Years 1976 and 1981

	1976 (in thousands of dollars)	1976 (Percentage)	1981 (in thousands of dollars)	1981 (Percentage)
Local				
Taxes	$11,679	51%	$15,012	33%
Other	4,248	19	9,632	21
Total	$15,927	70%	$24,644	54%
State	4,529	20	18,550	40
Federal	2,140	10	2,684	6
Total	$22,596	100%	$45,878	100%

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[a] See note b, Table 12.

[b] Cordova, Fairbanks, Homer, Kenai, Ketchikan, Kodiak, North Pole, Palmer, Petersburg, Soldotna, Seward, Wasilla, Wrangell. General revenues of Valdez are excluded here and shown in Table 9A.

Sources: Alaska city governments, annual financial reports, fiscal years 1976 and 1981.

ment more through their own taxes than through state aid. So we look first at broad changes in revenues among other boroughs and cities, and then specifically at the North Slope Borough and Valdez.

Overall, general revenues of Alaska's boroughs and large cities (excluding the North Slope Borough and Valdez) roughly doubled between 1976 and 1981, with some sources of revenues growing modestly and others very quickly. The two fastest-growing revenue sources were state aid (as we would expect) and local sources other than taxes— which include interest income from investments and charges for services. Tax collections and federal aid increased relatively little between 1976 and 1981.

Because of these different rates of growth in revenue sources, state aid had become twice as important a source of municipal revenues by 1981 than it had been in 1976, while local taxes by 1981 made up a much smaller share of overall revenues. State dollars in 1976 made up about 16 percent of borough general revenues and 20 percent of revenues of large cities; by 1981, state aid accounted for 27 percent of borough and 40 percent of city revenues. By contrast, local taxes, which had made up 70 percent of borough revenues and more than half of city revenues in 1976, accounted for only 42 percent of borough and 33 percent of city revenues by 1981.

Local non-tax revenues were a much more significant source of borough and city revenues in 1981 than in 1976; such non-tax revenues accounted for 25 percent of borough revenues in 1981, as compared with only 6 percent 5 years earlier. A large share of this non-tax revenue in 1981 was interest income on municipal investments; high interest rates in 1981 boosted returns on municipal investments far higher than they had been in previous years.

Table 14

North Slope Borough General Revenues,* by Source, Fiscal Years 1976 and 1981

	1976		1981	
	(in thousands of dollars)	(Percentage)	(in thousands of dollars)	(Percentage)
Local				
Taxes	$7,387	60%	$62,776	76%
Other	2,541	21	24,747	27
Total	$9,928	81%	$87,523	92%
State	2,208	18	5,407	5
Federal	97	1	222	1
Total	$12,233	100%	$93,153	100%

*See note b, Table 12.

Source: North Slope Borough, annual financial reports, fiscal years 1976 and 1981.

Table 15

General Revenues* of the City of Valdez, by Source, Fiscal Years 1976 and 1981

	1976		1981	
	(in thousands of dollars)	(Percentage)	(in thousands of dollars)	(Percentage)
Local				
Taxes	$6,554	77%	$10,824	56%
Other	880	10	5,669	29
Total	$7,434	87	$16,493	85
State	1,055	12%	2,724	14%
Federal	29	1	156	1
Total	$8,518	100%	$19,373	100%

*See note b, Table 12.

Source: City of Valdez, annual financial reports, fiscal years 1976 and 1981.

Federal aid as a proportion of overall borough and city general revenues declined slightly between 1976 and 1981, even though actual dollars of federal aid increased over that period. The moderate growth in federal aid was far outpaced by growth in state aid; in 1981, federal aid accounted for about 6 percent of general revenues of boroughs and large cities.[12]

Overall, the burden of financing Alaska's growing borough and city governments fell less on local taxpayers and more on state government in recent years. Although we do not have 1982 financial reports from all municipalities as of this writing, it is very likely that state dollars made up an even larger proportion of municipal revenues in 1982 than in 1981, since state operating aid was much higher in 1982. In Anchorage, for example, where half of all Alaskans live, state aid in 1982 made up 42 percent of general government revenues.

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[12] By comparison, state dollars nationwide accounted for about 16 percent of the 1981 general revenues of cities. Taxes made up more than half of the average American city's general revenues in 1981, and other local sources, including charges for services and interest income, accounted for another 21 percent. Federal dollars made up 9 percent of cities' general revenues that year.

North Slope Borough and Valdez Revenues

Oil and gas property in the City of Valdez, site of the oil pipeline terminal, was valued at about $1.7 billion in 1982. Petroleum property in the North Slope Borough, which includes the Prudhoe Bay oil field and related facilities, was valued at about $8.3 billion that year. Valdez has a population of about 3,300, and the North Slope Borough has a permanent population of about 4,500 in eight villages and a transient population of several thousand Prudhoe Bay workers. (The magnitude of these tax bases becomes clearer if we note that all property in Anchorage, where more than 200,000 Alaskans live, was valued at about $10.6 billion in 1982.)

Tables 14 and 15 show what valuable petroleum property means to these two municipalities. Valdez took in about $10 million in property taxes for general expenses in 1981, which accounted for 56 percent of the city's general revenues. Other local sources—chiefly interest income on investments—netted the city an additional $5.6 million that year. Together, taxes and other local sources made up about 85 percent of Valdez's general revenues in 1981. State aid of about $2.7 million accounted for 14 percent of the city's general revenues; in other large cities that year, state aid made up about 40 percent of general revenues. This is not to say that Valdez got relatively less state aid than other cities, but rather that Valdez's own sources of income were larger in proportion to state aid.

In the North Slope Borough, property and other taxes increased from just over $7 million in 1976 to $63 million in 1981, with almost all these taxes paid by oil companies operating at Prudhoe Bay. Other local sources of revenue—primarily interest income on investments—brought the borough an additional $24 million in 1981. State aid (of about $5.5 million) made up 5 percent of the North Slope Borough's general revenues that year, while it made up about 27 percent of revenues among other boroughs.

In the current fiscal year, the North Slope Borough will take in approximately $138 million in property taxes. (By comparison, the Municipality of Anchorage will take in $87 million in property taxes for general government and school costs in 1983.) As shown in Table 16, the North Slope Borough's property tax rate of 16.4 mills was the highest among Alaska boroughs in 1982. About two-thirds of the borough's fast-rising tax collections in recent years have been for debt service on its general obligation bonds.

The borough's debt service payments are large because by mid-1983 it had sold nearly $1 billion in general obligation bonds to finance a capital improvements program underway in the borough's villages. (The State of Alaska restricts local government taxation of petroleum property, but these restrictions do not apply to taxes collected for payment of debt service on general obligation bonds.) As Table 11 shows, the North Slope Borough carries a large share of all municipal debt in Alaska.

Tax Rates

Table 16 shows what growing tax bases and increased state aid meant to local taxpayers in the early 1980s: dropping property taxes.

Property taxes in a number of Alaska's boroughs and large cities were high in 1976. In the former City of Anchorage—now part of the unified Municipality of Anchorage—residents paid taxes of more than 20 mills. (One mill equals $1 in taxes for each $1,000 of assessed value of property.) In other cities within boroughs—or former cities in unified municipalities—property owners commonly paid 15 or more mills. Between 1976 and 1979, growing tax bases allowed a number of local governments to cut their tax rates. For example, in 1976 residents of the City of Kenai in the Kenai Peninsula Borough paid a rate of 21 mills; by 1979 that rate had dropped to 15 mills.

Then, between 1979 and 1982, the state legislature appropriated many millions of dollars in increased aid for local operating expenses and urged municipal officials to use this extra state money to reduce taxes. More state dollars allowed almost all boroughs and cities within boroughs to cut tax rates significantly. The biggest tax cuts in many boroughs were made between 1980 and 1981; a few boroughs and cities cut tax rates more than 50 percent just between those years. Boroughs that cut their tax rates most in 1981 include the Fairbanks North Star Borough, the Kenai Peninsula Borough, and the Ketchikan Gateway Borough.

It was common for 1982 tax rates in boroughs to be 30 to 40 percent lower than they had been before the state began massively increasing aid payments to municipalities. The exception was the North Slope Borough, as discussed in the preceding section, where the mill rate increased more than 50 percent in recent years.

At the same time that tax rates were going down in most boroughs, the value of property was, as shown in Table 10, increasing rapidly. As an illustration of what this combination of reduced tax rates and increased property value meant to individual taxpayers in recent years, the Municipality of Anchorage[13] calculated this example: Given the average

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[13] Municipality of Anchorage, budget office, 1982.

Table 16

Property Tax Rates, Alaska Boroughs, Selected Years, 1976-1982
(in mills)

	1976	1979	1980	1981	1982
Unified and Home-Rule Boroughs					
Municipality of Anchorage					
Former City of Anchorage	20.44	13.79	12.06	8.30	7.18
Outside Service Areas[a]	12.02	8.87	7.29	3.76	3.24
City and Borough of Juneau					
Former City of Juneau	15.36	12.95	12.83	7.74	11.87
Outside Service Areas[a]	14.08	10.36	9.82	3.23	8.07
City and Borough of Sitka	5.00	3.50	3.50	3.00	3.00
North Slope Borough	10.30	10.35	10.35	16.70	16.42
Second- and Third-Class Boroughs					
Bristol Bay Borough	14.00	9.00	7.50	6.50	5.00
Fairbanks North Star Borough					
City of Fairbanks[b]	16.30	15.68	13.70	6.00	6.90
Outside Service Areas[a]	6.30	7.18	6.20	5.50	6.40
Kenai Peninsula Borough					
City of Kenai[b]	21.20	15.00	12.80	4.70	3.93
Outside Service Areas[a]	5.00	2.50	2.50	1.75	1.25
Ketchikan Gateway Borough					
City of Ketchikan[b]	21.40	16.00	15.10	5.90	5.80
Outside Service Areas[a]	9.60	4.50	2.50	1.00	1.00
Kodiak Island Borough					
City of Kodiak[b]	16.33	12.18	12.98	7.50	9.00
Outside Service Areas[a]	7.23	6.18	6.98	5.50	5.00
Mat-Su Borough					
City of Palmer[b]	13.00	12.20	13.40	10.70	8.90
Outside Service Areas[a]	8.00	7.40	8.95	7.22	5.40
Haines Borough[c]					
City of Haines[b]	15.33	8.20	10.50	8.50	8.00
Outside Service Areas	7.60	2.00	1.00	1.00	2.00

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[a] "Outside service areas" means areas within boroughs that receive only the areawide borough services (education being the primary areawide service in all boroughs); because residents of such areas receive fewer services than do residents of cities or service areas, they pay lower property taxes.

[b] For first-class cities within second- and third-class boroughs, these tax rates are combined city and borough taxes.

[c] The Haines Borough is the only third-class borough in Alaska.

Source: Alaska Department of Community and Regional Affairs, *Alaska Taxable*, annual.

annual increase in value of existing property in Anchorage, a house that was worth $88,500 in 1979 would have been worth $116,700 by 1982. At the existing mill rate of 13.79 in the Anchorage bowl area in 1979, the owner of that house assessed at $88,500 would have paid $1,220 in property taxes. By 1982, with his house now valued at $116,700 but the mill rate reduced to 7.18, the owner's tax bill was $838—or $380 less than it had been in 1979, even though the property was worth substantially more.

In 1983, however, the brief era of very low property taxes is ending. As discussed further in the concluding section, cutbacks in state aid for municipal school construction debt, and in the municipal assistance program, have already started pushing property taxes back up in a number of large municipalities.

SUMMARY AND CONCLUSIONS

Overall then, Alaska's municipalities hired scores of employees, added new services, built hundreds of public facilities, and cut their tax rates on the strength of state oil revenues that are now waning. As soon as the State of Alaska's petroleum income dropped from its peak in 1982, local governments felt the effects of the fall.

With less money to spend, the legislature began searching for ways to reduce the various state aid programs for schools. The legislature initially appropriated $392 million for the school foundation program for fiscal 1983, which was about $25 million short of the amount local officials had calculated they were entitled to under the foundation formula. Municipal officials succeeded in getting that extra $25 million for 1983 in a supplemental appropriation, but proposed school foundation funding for the upcoming school year varies from about $415 million to $430 million—both substantially short of the roughly $448 million school officials have asked for. If the final appropriation does fall millions of dollars short of what cities and boroughs expect to receive, urban districts will have to either reduce costs or require local taxpayers to make up the difference. Residents of REAAs (large, rural school districts) pay no local taxes, so those districts presumably would have to adjust to less money.

The legislature also moved to hold down school aid by cutting back reimbursement of boroughs and cities for debt service on school construction bonds. In fiscal 1983, the legislature appropriated enough to repay municipalities for about 63 percent of their school construction debt, as compared with the 90 percent reimbursement allowed under state law. Several boroughs sold millions of dollars in general obligation bonds for school construction, in the expectation that the state would pick up 90 percent of the costs. Some municipalities raised their 1983 property tax rates to make up for this shortfall.

While municipalities can (at least in theory) adjust to less state operating money for schools by reducing operating costs (and thus avoid raising property taxes), they cannot reduce the general obligation debt they have incurred in building schools. That debt is a legal responsibility of the municipalities, .

The legislature did agree to reimburse school districts for 90 percent of their construction debt in fiscal 1984, but at the same time voted to restrict state reimbursement for school debt incurred in the future to 50 percent.

Reduced state money for education has already revived an old controversy that had lain dormant during the years when state money flowed freely: the debate over the state's policy of paying all costs of building and operating schools in rural districts, while requiring city and borough districts to pay a portion of construction and operating costs. The state's historic rationale for this policy has been that urban areas with larger populations and bigger tax bases could afford to pay some of the costs of their schools, while rural villages with very small tax bases could not. Some urban officials have maintained that REAAs should be required to pay a portion of school costs, or, conversely, that the state should pay all costs of both urban and rural schools.

One borough has filed suit against the state, charging that the state has no consistent policy for providing comparable aid for education statewide.

It seems very unlikely that in the face of falling revenues the state will agree to assume even more school costs than it already bears. What does seem probable is that the state will continue to look for ways of holding down its education costs—not only by shifting increased costs to urban taxpayers, but also by examining ways of reducing rural school costs.

State aid for general government expenses of municipalities also appears to be in decline. The fiscal 1983 appropriation for the municipal assistance program was about $71 million, as compared with $87 million the previous year. It was primarily this program—together with the older state revenue-sharing program—that allowed local governments to cut their property taxes so sharply in 1980 and 1981. Municipal officials have asked for an additional $25 million in operating aid for this year, but to date the legislature has not approved the extra money and has proposed to fund municipal assistance at around $71 million again in fiscal 1984. In any case, legislators have made it clear that since the state itself has less money, local governments can expect to get less state money in the coming years. The 1983 drop in the municipal assistance program has already translated into a mill rate increase in Anchorage and some other communities.

Some Alaskans are worried that the windfall in state aid during the early 1980s pushed local spending beyond what urban areas can reasonably support or the state itself can maintain in rural areas. One way to tell if local government spending in urban areas has grown out of proportion to the tax base would be to determine what local taxes would have been in 1983 if tax collections had grown at the same rate as local spending in recent years. We do not have complete budget and tax collection figures for all large municipalities through 1983, but Figure 2 provides such figures for Anchorage, where half of all Alaskans live.

The figure shows growth in general government spending (including the local appropriation for schools) and tax collections in Anchorage from 1976 through 1983, and also what tax collections would have looked like since 1980, if tax collections had grown at the rate of spending (and thus maintained their historic relationship to spending).

From 1976 through 1979, tax collections and general fund expenses in Anchorage grew at about the same rate, with taxes paying roughly 70 percent of general government costs. During that period, the city's tax base grew substantially, so the municipality was able to reduce tax rates (Table 16) while at the same time increasing overall tax collections.

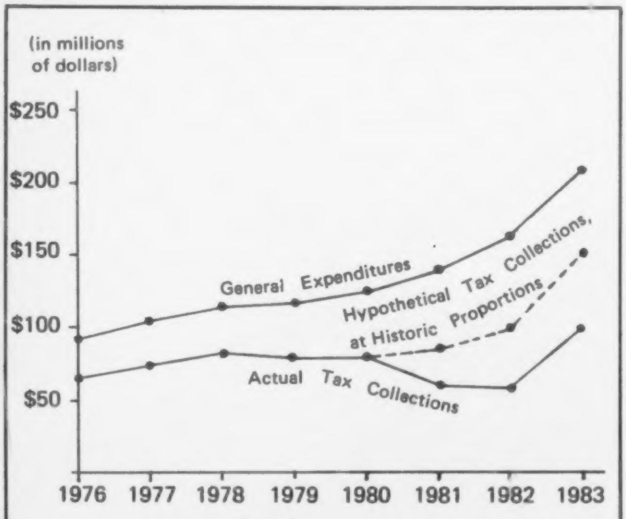

Figure 2. General Fund Expenditures* and Tax Collections, Municipality of Anchorage, 1976-1983

*Includes spending for general government functions, and the appropriation for school operating costs.

In 1980, when the municipality began receiving more state money, spending climbed and taxes dropped. By 1982, when mill rates and overall property tax collections were at their lowest, taxes paid for about 36 percent of Anchorage's general expenses. In 1983, taxes increased for the first time since 1979; the municipality expects to take in $87 million in taxes this year, as compared with about $59 million in 1982. With Anchorage's tax base now at about $10 billion, property owners will pay between 5 and 9 mills in various parts of the municipality this year, as compared with approximately 3 to 7 mills in 1982.

If, however, taxes still paid for 70 percent of general spending—as they did before the jump in state aid in 1980—the municipality would have to take in $147 million in taxes this year, or 80 percent more than the $87 million it actually plans to collect. An 80 percent increase in taxes would mean Anchorage's property owners would pay between 9 and 16 mills. These hypothetical mill rates would be slightly higher than 1979 rates, which varied from less than 9 mills to almost 14 mills.

Figure 2 tells us that the Anchorage tax base could in fact support the current level of spending—even if state aid were reduced to its pre-1980 level. But taxes would be as high or higher than they were in 1979. So, property tax reductions in Anchorage in the early 1980s were due largely to increases in state aid.

In the years beyond 1983, however, Anchorage and other communities will face not only declining state aid but also added costs of operating and maintaining new public facilities. Many of the public works projects the state is paying for are not yet complete—but when they are, it is the municipalities and not the state that will pay to operate and maintain them. As state aid declines, the added local costs of maintaining current programs and paying for new public facilities could push property taxes beyond their historic levels.

Municipal officials we interviewed in a number of urban areas in 1982 said that local governments would hold property taxes to a reasonable level—although certainly not at their current low levels—by curbing spending, imposing user fees for new public facilities, and broadening their tax bases through development of nonpetroleum industries.

However, even as state oil revenues shrink, state aid for education and other costs will continue to be an important source of local government revenues in urban Alaska, and rural municipalities with small tax bases will continue to look to the state for most of their revenues. The State of Alaska now faces the difficult job of managing its still-substantial—although diminishing—oil wealth to secure Alaska's economic health in the decades beyond the 1980s. To a large extent, the fortunes of Alaska's local governments are also riding on the state's success in converting its temporary oil wealth to a long-term source of income.

* * * *

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Established in 1961 by the Alaska Legislature, the Institute of Social and Economic Research operates as a principal research organization within the University of Alaska system. Since its early beginnings on the Fairbanks campus, ISER has developed into a full-scale economic and social science research institute, dedicated to applying its multi-disciplinary skills to the problems of social and economic change in Alaska. Presently headquartered in downtown Anchorage at 707 A Street, with offices in Fairbanks and Juneau, the institute now comprises a select staff of professionals, whose academic backgrounds and research experiences encompass a broad spectrum of professional disciplines and policy issues.

ISER investigates such issues as the economics of natural resource development, principally petroleum and fisheries, and multiple-use land management; the social and economic impacts of resource developments such as oil and gas pipelines, petrochemical facilities, and hydroelectric projects; the state's transportation and energy requirements; the development of human resources; and the effects of modernization on Alaska Native peoples and cultures and on the quality of life in Alaska.

Other important ISER objectives are to:

- *Provide professional assistance to public and private organizations to help meet socioeconomic needs of Alaska's population.* Staffmembers serve as advisors to or members of the Alaska Native Foundation, the Cook Inlet Native Foundation, the Women's Resource Center, the Alaska Permanent Fund, and the Alaska Census Advisory Committee.
- *Sponsor discussion of public issues.* Examples: the Alaska Growth Policy Symposium, the Alaska Constitutional Review (both co-sponsored by the Alaska Humanities Forum), and the Alaska Science Conference.
- *Contribute to the academic program of the University of Alaska and assist in the establishment of graduate programs in the Social Sciences.* In addition to their institute responsibilities, staffmembers often teach within their disciplines. Correspondingly, members of the University's teaching faculty are affiliated with ISER and participate in its research activities.
- *Promote the exchange of information between the University of Alaska and other institutions.* Examples: sponsoring faculty exchanges and visiting professors; exchanging institute publications with other research institutes in the U.S. through membership in such professional organizations as the Association for University Business and Economic Research (AUBER); and exchanging information with the USSR Academy of Sciences.

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